

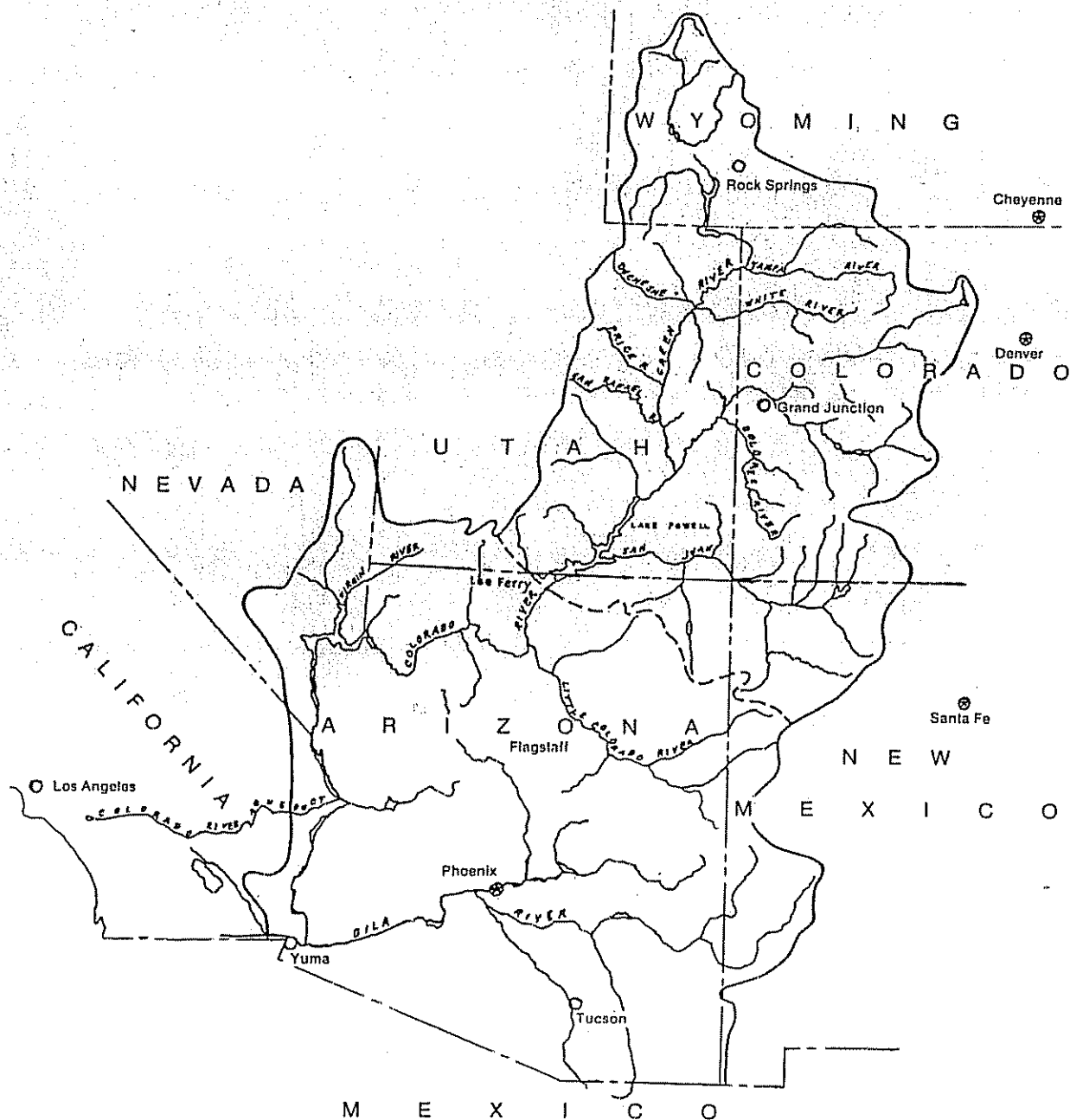
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Report on the
1990 REVIEW

**WATER QUALITY STANDARDS FOR SALINITY
COLORADO RIVER SYSTEM**

May 1990



PREPARED BY
COLORADO RIVER BASIN SALINITY CONTROL FORUM

1/4

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SUMMARY

Section 303 of the Clean Water Act of 1977 requires that water quality standards be reviewed from time to time, but at least once during each three-year period beginning in 1972. Accordingly, the seven-state Colorado River Basin Salinity Control Forum (Forum) has reviewed the existing state-adopted and Environmental Protection Agency (EPA) approved numeric salinity criteria and plan of implementation for salinity control for the Colorado River System. Changes in hydrologic conditions and water use within the Colorado River basin have been evaluated, and this Review presents the recommended revisions to the plan of implementation which are to be submitted to each of the Basin states for consideration at a public hearing prior to adoption.

The Forum finds no reason to recommend changes in the numeric salinity criteria at the three lower main stem stations. The numeric criteria at these stations are:

	<u>Salinity in mg/l</u>
Below Hoover Dam	723
Below Parker Dam	747
Imperial Dam	879

The plan of implementation as set forth in the 1990 Review is designed to meet the objective of maintaining the salinity concentrations at or below the above numeric criteria while the Basin states continue to develop their compact-apportioned waters. The plan is based on the assumption of a long-term water supply of 15 million acre-feet annually. The Forum recommends that the plan of implementation described in this report be carried out. The plan of implementation includes:

1. Completion of the Bureau of Reclamation, Bureau of Land Management, and the Department of Agriculture salinity control measures shown in the following table, to the extent that each unit remains viable and appropriately cost-effective. The plan's current remaining federal construction costs for the Bureau of Reclamation and the Department of Agriculture activities are approximately \$669 million.

2. Imposition of effluent limitations, principally under the National Pollutant Discharge Elimination System (NPDES) permit program on industrial and municipal discharges by implementation of the Forum-recommended "Policy for Implementation of Colorado River Salinity Standards Through the NPDES Permit Program."

3. Implementation of the Forum-recommended "Policy for Use of Brackish and/or Saline Waters for Industrial Purposes."

4. Implementation of the Forum-recommended "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program for Intercepted Ground Water."

**Recommended Salinity Control Plan
Implementation Schedule 1990-2010**

	<u>Begin Implemen- tation</u>	<u>Projected Date Complete</u>	<u>Tons/yr Removed Jan 1990</u>	<u>Projected Salt Removed Tons/yr</u>
Meeker Dome (USBR)	Complete	1983	48,000	48,000
Las Vegas Wash Pittman (USBR)	Complete	1985	3,800	3,800
Grand Valley Stage One (USBR)	Complete	1984	21,900	21,900
BLM well plugging & nonpoint	Complete	1986	8,000	8,000
Grand Valley (USDA)	1979	2010	36,400	163,000
Uinta Basin (USDA)	1980	2010	36,400	98,200
Grand Valley Stage Two (USBR)	1985	1997	25,600	115,600
Lower Gunnison 1 (USDA)	1989	2010	700	82,100
Big Sandy River (USDA)	1988	2006	2,700	52,900
Paradox Valley (USBR)	1988	1994		180,000
McElmo Creek (USDA)	1990	2007		38,000
Dolores Project (USBR)	1991	1995		23,000
Nonpoint Sources (BLM)	1991	2010		36,000
Glenwood Springs (Private)	1991	1991		73,000
Lower Gunnison Win Wtr (USBR)	1991	1995		74,000
Lower Gunnison 2, Mont. (USDA)	1991	2010		81,700
Lower Gunnison 2, Delta (USDA)	1991	2010		104,700
Moapa Valley (USDA)	1991	2002		19,500
Lower Gunnison 3, (USDA)	1992	2006		12,000
San Juan-Hammond (USBR)	1994	1996		27,700
San Juan-Hammond Portion (USDA)	1994	2007		12,500
Uinta Basin I (USBR)	1994	1999		25,500
Price-San Rafael (USBR)/(USDA)	1994	2010		162,900
			<u>185,300</u>	<u>1,464,000 ^{1/}</u>

Units under consideration,
but currently not in the plan

Units Investigated, but
no longer being considered

Lower Virgin River (USBR)

Dirty Devil River (USBR)

Sinbad Valley (USBR)

LaVerkin Springs (USBR)

Mancos Valley (USDA)

Palo Verde Irrigation District (USBR)

Lower Gunnison Stage I Balance (USBR)

Grand Valley II Balance (USBR)

Lower Gunnison North Fork (USBR)

Virgin Valley (USDA)

^{1/} Reduction to maintain the numeric criteria through 2010.

5. Implementation of the Forum-recommended "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program for Fish Hatcheries."

6. Implementation of nonpoint source management plans developed by the states and approved by EPA.

The plan of implementation is designed to control enough salt to maintain the numeric criteria under a long-term mean water supply of 15 million acre-feet per year. It is recognized that the river system is subject to highly variable flows. Consequently, salinity will vary from year to year and may temporarily exceed the adopted numeric criteria in some years and remain well below the criteria in others. The federal regulation provides for such temporary increases above the numeric criteria.

If any increases in salinity above the criteria result from human activities because development projects are completed before control measures are brought on line, temporary increases above the criteria could result. However, these increases will be deemed in conformance with the standards if appropriate salinity control measures are included in the plan.

Increases above the criteria as a result of below normal annual river flows and/or low reservoir storage conditions will also be considered in conformance with the standards, provided that when river flows return to normal and satisfactory reservoir conditions prevail, concentrations will be at or below the criteria level.

Current salinity concentrations at the three criteria stations are:

	<u>Numeric criteria in mg/l</u>	<u>1989 salinity concentration in mg/l*</u>
Below Hoover Dam	723	582
Below Parker Dam	747	594
Imperial Dam	879	682

There is no reason to believe that the numeric criteria will be exceeded during the next three-year review period. Further, because of the long lead time required to conduct salinity studies, complete feasibility reports, authorize, implement, and achieve full impact at lower main stem stations, it is necessary to continue efforts to appropriate funding for the recommended plan of implementation for salinity control as set forth in this Review.

*Flow-weighted average annual salinity.

COLORADO RIVER BASIN

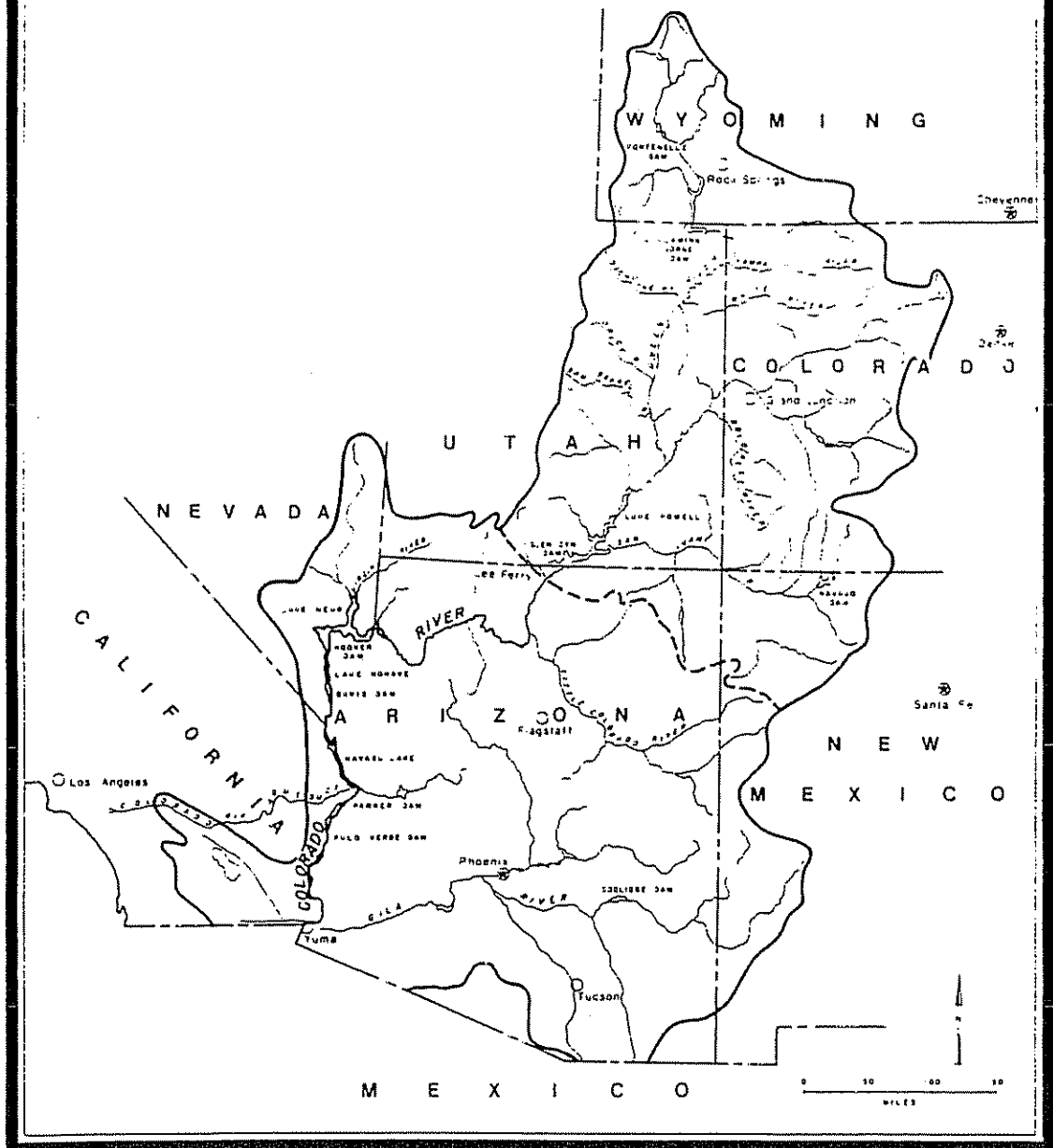


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CHAPTER I - INTRODUCTION

Purpose of Report

This report is in response to Section 303(c) of the Clean Water Act of 1977 (Public Law 92-500 as amended by Public Law 95-217 and Public Law 100-4) referenced to in this report as the Clean Water Act.

This report is written as a complete document, but contains historical information only for the 1987-90 period. Background information regarding historical actions relative to the adoption of salinity standards is contained in the 1975 report. The 1978, 1981, 1984, and 1987 reports contain information pertaining to the 1975-1978 period, 1978-81 period, 1981-84 period, and 1984-87 period, respectively.

Section 303(c)(1) of the Clean Water Act requires that:

"The governor of a state or the state water pollution control agency of such state shall from time to time (but at least once each three-year period beginning with the date of enactment of the Federal Water Pollution Control Act Amendments of 1972) hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards. Results of such review shall be made available to the Administrator."

This report, prepared by the seven-state Colorado River Basin Salinity Control Forum (Forum) is a Review of the water quality standards including numeric criteria and plan of implementation previously developed and adopted by the Forum. This is the fifth such Review prepared by the Forum. This Review includes the modifications to the 1987 Forum Review and the July 1987 Supplement that have become necessary as a result of changed conditions and the availability of better information.

History and Background

In the 1960's and early 1970's, the seven Colorado River basin states and representatives of the Federal Government discussed the problem of increasing salinity levels in the lower reaches of the Colorado River. In 1972, the Federal Government enacted the Clean Water Act which mandated efforts to maintain water quality standards in the United States. At the same time, Mexico and the United States were discussing increasing salinity levels in Colorado River water being delivered to Mexico. In 1974, with Basin-state support, the Congress enacted the Colorado River Basin Salinity Control Act (P.L. 93-320). Title I of that Act addresses the United States' commitment to Mexico.

Title II created a salinity control program for water quality in the United States. Primary responsibility for the federal program was given to the Secretary of the Interior, with the Bureau

of Reclamation (Reclamation) being instructed to build and investigate several salinity control units. The Secretary of Agriculture was instructed to support the effort within existing authorities. See page 30 regarding the specific authorization under P.L. 93-320.

In 1984, the Colorado River Basin Salinity Control Act was amended. This was the first major legislative change since the 1974 enactment of the authorization for the program (P.L. 93-320). The 1984 legislative amendments directed the Secretaries of the Interior and Agriculture to give preference to the salinity control units which reduce salinity at the least cost per unit of salinity reduction. Stage I of the Lower Gunnison Basin Unit, Colorado, and the McElmo Creek Unit (as a part of the Dolores Participating Project), Colorado, were both authorized. The Crystal Geyser Unit, Utah, authorized in 1974, was de-authorized.

A major provision of the legislation was the enactment of a voluntary onfarm salinity control program to be administered by the Department of Agriculture. Further, the Secretary was directed to allow for the voluntary replacement of fish and wildlife values foregone as irrigation improvements were implemented.

The Forum is composed of water resource and water quality representatives from each of the seven Colorado River basin states (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming) appointed by the governors of the respective states. The Forum was established for the purpose of interstate cooperation and to provide the states with the information necessary to meet the Environmental Protection Agency's (EPA) regulation, 40 CFR, Part 120, entitled Water Quality Standards, Colorado River System: Salinity Control Policy and Standards Procedures and Section 303(a) and (b) of the Clean Water Act. The four previous reviews were conducted by the Forum in response to Section 303(c), as is this report.

The 1975 Forum report includes a detailed discussion of the legislation and events leading up to the establishment of salinity standards for the lower main stem of the Colorado River. The standards were adopted by all of the Basin states and subsequently approved by the EPA. The 1978, 1981, 1984, and 1987 reports reviewed the numeric criteria included in the 1975 report and concluded that no change was warranted; however, the plan of implementation was updated to reflect the circumstances at those times and changes that had taken place in the salinity control projects status since 1975.

The plan of implementation, as set forth in this and the earlier Forum Reviews, includes effluent limitations for industrial point source discharges with the objective of no-salt return whenever practicable. In February 1977, the Forum adopted the "Policy for Implementation of Colorado River Salinity Standards Through the NPDES Permit Program." This policy provides detailed guidance in the application of salinity standards in the regulation

of municipal and industrial point source discharges. On September 11, 1980, the Forum adopted a policy to encourage the use of brackish and/or saline waters for industrial purposes where it is environmentally sound and economically feasible. A third policy dealing with intercepted ground water was adopted by the Forum on October 20, 1982. On October 28, 1988, a fourth policy which deals specifically with discharges from fish hatcheries was adopted by the Forum. All of the Forum policies are included in Appendix A.

Nothing in this report shall be construed to alter, amend, repeal, interpret, modify, or be in conflict with the provisions of the Boulder Canyon Project Act (45 Stat. 1057), the Boulder Canyon Project Adjustment Act (54 Stat. 774), the Colorado River Basin Project Act (82 Stat. 885), the Colorado River Compact, the Upper Colorado River Basin Compact, or the Treaty with the United Mexican States (Treaty Series 994).

This Review is consistent with the EPA-approved 1975, 1978, 1981, 1984, and 1987 Reviews and deals only with the portion of the Colorado River basin above Imperial Dam. As used in this Review, the lower main stem of the Colorado River System is defined as that portion of the main river from Hoover Dam to Imperial Dam.

Below Imperial Dam, the river's salinity is controlled to meet the terms of the salinity agreement with Mexico found in Minute No. 242 of the International Boundary and Water Commission (IBWC), entitled "Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River." This agreement states that measures will be taken to assure that the waters delivered to Mexico upstream from Morelos Dam will have an average annual salinity concentration of no more than 115 ppm (\pm 30 ppm) total dissolved solids greater than the average annual salinity concentration of Colorado River water arriving at Imperial Dam. Title I of the Colorado River Basin Salinity Control Act, Public Law 93-320 is the legislation which implements the provisions of Minute No. 242. Minute No. 242 of IBWC and Title I of P.L. 93-320 constitute a federal numeric criterion and plan of implementation for the river below Imperial Dam.

Program Funding

The success of the federal/state cooperative Colorado River Salinity Control Program is contingent upon sufficient funding to allow the plan of implementation to proceed as scheduled.

In fiscal years 1988, 1989, and 1990, the Colorado River basin states urged the Congress to provide the Reclamation, the Bureau of Land Management (BLM), and the Department of Agriculture (USDA) with adequate funds to implement the authorized salinity control program. The following is a summary of the Forum's funding recommendations and the federal appropriations for Fiscal Years 1988, 1989, and 1990.

SUMMARY OF PROGRAM FUNDING

	1988		1989		1990	
	Forum Recommendation	Appropriation	Forum Recommendation	Appropriation	Forum Recommendation	Appropriation
Bureau of Reclamation	31,070,000	20,783,000	24,050,000	16,798,000	19,550,000	14,185,000
Bureau of Land Management	no recommendation	0	no recommendation	0	1,500,000	250,000
Department of Agriculture	6,000,000	3,804,000	8,000,000	5,452,000	11,000,000	10,341,000

CHAPTER II - SALINITY OF THE RIVER

The Colorado River drains 244,000 square miles of the western United States and a small portion of northern Mexico. Its waters serve some 2.5 million people within the United States' portion of the basin and through export provides full or supplemental water supply to another 18.0 million people outside the basin. The regional economy is based on irrigated agriculture, livestock grazing, mining, forestry, manufacturing, oil and gas production, and tourism. About 2.5 million acres are irrigated within the basin and hundreds of thousands of acres are irrigated by waters exported from the basin. The Colorado River also serves about 1.7 million people and 500,000 irrigated acres in Mexico.

Salinity¹ has long been recognized as one of the major problems of the river. The Colorado, like most western rivers, increases in salinity from its headwaters to its mouth, carrying a salt load of about 9 million tons annually past Hoover Dam, the upper most location at which numeric criteria has been established. In addition to total salt load (tons), this report also examines salinity in terms of concentration (mg/l).

It must be emphasized that all of the salts in the Colorado River System are natural. Many of the sedimentary rocks of the basin were deposited in environments which were saline. Salts deposited with the rocks can be dissolved and transported by the river system. This makes the strategies and planning related to salinity control much different than in river systems where man is inducing a non-natural pollutant into the system at point sources. In the Colorado River drainage, salt is pervasive; it is literally everywhere. The salinity control program is designed to prevent a portion of this almost limitless salt supply from becoming dissolved and moving through the river system.

The Environmental Protection Agency (EPA) analyzed the salt loading and for convenience divided it into two categories: natural and human-caused. They concluded that about half the salt loading to the river is from natural causes. This division of salts into a "natural causes" category, however, may be an oversimplification, and the classification may be misleading. This natural causes category includes salt contributions from nonpoint (excluding irrigated agriculture) or unidentified sources or from the vast, sparsely populated regions of the drainage, much of which is administered by the BLM or other government agencies. Man's activities in these vast regions, however, do influence the rate

¹ Salinity is a measure of the total dissolved solids of a water sample including all inorganic material in solution, whether ionized or not. The principal constituents found in Colorado River water are: calcium, magnesium, sodium, sulfate, chloride and bicarbonate. The terms "salinity" and "total dissolved solids" are considered equivalent.

of natural salt movement from the rocks and soils to the river system. Activities of man which influence the "natural" contribution include grazing, logging, mining, oil exploration, road building, recreation, and others. Natural causes include salt contribution from saline springs, ground water discharge into the river system, erosion and dissolution of sediments, and the concentrating effects of evaporation and transpiration.

Of the land within the Colorado River basin, about 75 percent is owned and administered by the Federal Government or held in trust for Indian tribes. By far the greatest portion of natural salt load originates on these federally owned and administered lands.

Human-caused increases in salinity concentration, as identified by EPA, result from a number of man's activities. EPA estimated that out-of-basin exports account for about 3 percent of increased salinity concentrations, irrigation accounts for about 37 percent, reservoir evaporation accounts for about 12 percent, and municipal and industrial uses account for about 1 percent. Of the salinity resulting from human activities, irrigated agriculture accounts for the largest share. Much of this contribution is from federally developed irrigation projects.

Evaluations of the salinity of the Colorado River have been made by Reclamation, the U.S. Geological Survey (USGS), and the Bureau of Land Management (BLM). They were published by the agencies during the period of this Review (1987-1989).

In order to evaluate changes in salinity, water quality and streamflow data are obtained on a daily, weekly, monthly, or quarterly basis at various points on streams throughout the basin by the USGS in cooperation with the states and other federal agencies. Average annual salinity concentrations and salt loads are determined on a flow-weighted basis using the most frequent data available. Gaging stations in the basin which are of significance to this report, and for which streamflow and water quality records are available, are listed on Table 1. This table shows the mean streamflow and flow-weighted mean dissolved solids concentrations for key stations during the period 1941-1988. Where the water quality information is not complete, the missing data have been estimated by correlation with data from other stations.

Historical Salinity Concentrations

Salinity concentrations of the river have fluctuated significantly over the period of record, (1941-1989; Figure 1). Salinity concentrations generally decrease in periods of high flows and increase in periods of low flows. Figure 1 shows the mean annual flow of the Colorado River at Imperial Dam.

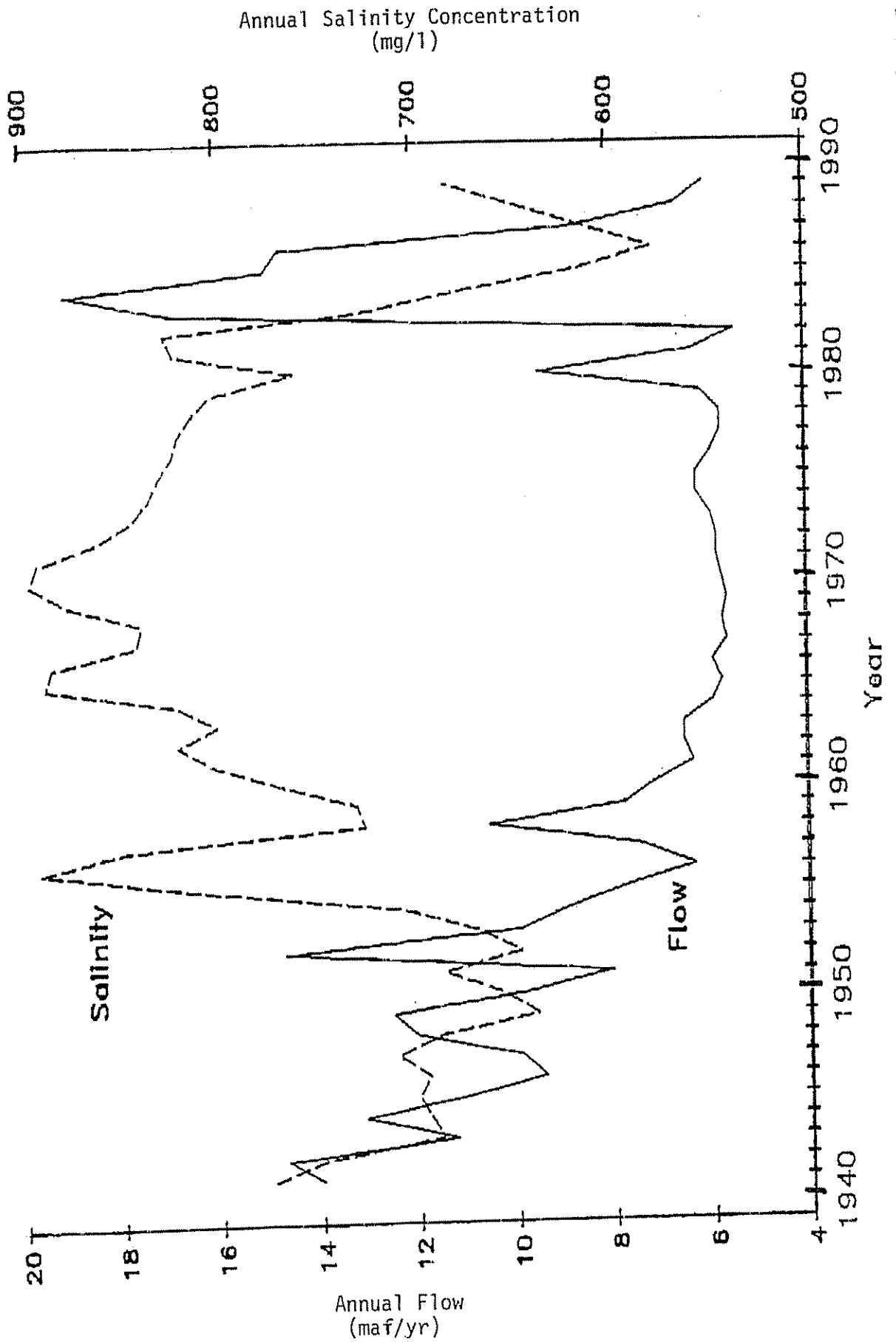
Table 1
Summary of Streamflow and Dissolved-solids Data
at Major Gaging Stations in the Colorado River Basin^{1/}

Station	Mean Streamflow (acre-ft/yr)	Flow-weighted Mean Dissolved-solids Concentration (mg/L)
Colorado R. near Glenwood Springs, CO	1,655,000	255
Colorado R. near Cameo, CO	2,868,000	385
Gunnison R. near Grand Junction, CO	1,834,000	550
Dolores R. near Cisco, UT	654,000	539
Colorado R. near Cisco, UT	5,226,000	559
Green R. near Green River, WY	1,307,000	298
Green R. near Greendale, UT	1,607,000	425
Yampa R. near Maybell, CO	1,118,000	166
Duchesne R. near Randlett, UT	444,000	622
White R. near Watson, UT	521,000	430
Green R. at Green River, UT	4,354,000	447
San Rafael R. near Green River, UT	98,000	1,505
San Juan R. near Archuleta, NM	930,000	158
San Juan R. near Bluff, UT	1,691,000	420
Colorado R. at Lees Ferry, AZ	10,777,000	533
Colorado R. below Grand Canyon, AZ	11,092,000	584
Virgin R. near Littlefield, AZ	173,000	1,541
Colorado R. below Hoover Dam, AZ-NV	10,635,000	663
Colorado R. below Parker Dam, AZ-CA	9,597,000	682
Colorado R. above Imperial Dam, AZ-CA	8,769,000	739

^{1/}For the period 1941-1988, from the Bureau of Reclamation salinity database.

Figure 1

FLOW & SALINITY CONCENTRATION
Measured at Imperial Dam
(1941 - 1989)



USGS Data

Salinity concentrations at Imperial Dam decreased steadily from 1970-79, increased in 1981-82, and decreased significantly from 1983-86. The period 1983 through 1986 was a period of above-normal runoff. Each of the four years had an estimated natural flow in excess of 20.0 million acre-feet (maf), with the four year average of 22.6 maf. Only one other period has had 20 maf of natural flow for two or more consecutive years (1920-21), and only one period (1920-23) had an estimated average natural flow exceeding 20.0 maf (20.4 maf). During 1983-86, the annual calendar year flow to Mexico exceeded scheduled deliveries by 12.6, 13.8, 10.1, and 9.2 maf, respectively, for a total of 45.7 maf.

The record high flows during the period 1983-86 produced a significant reduction in salinity concentrations in the lower main stem by approximately 250 mg/l at Imperial Dam. With river flows dropping below normal since 1987, salinity concentrations are increasing. However, because of the large volume of lower salinity water in the reservoirs, the rate of increase has been attenuated.

The flow-weighted average annual salinity at the stations for which numeric criteria have been set are shown in Table 2.

Projections of Future Water Depletions

One of the significant factors affecting salinity concentrations is water use. Estimates of both 1989 water use and projected future use through the year 2010 for each of the seven states were developed jointly by the states and Reclamation.

Table 3 presents a summary of projected water depletion in the Upper Colorado River basin, and from the main stem of the Lower Colorado River. Figure 2 presents the total water depletion.

Salt Routing Studies

Salt routing studies were made for the 1990 Review using the Colorado River Simulation System (CRSS) developed by Reclamation.² The CRSS is a package of computer programs and databases developed by Reclamation as a tool for use by water resource managers dealing with water related issues and problems in the Colorado River basin. The central feature of the CRSS is a computer program which simulates the flow of water and salt through the system and the operation of the reservoirs including hydroelectric power plants.

² Detailed information on CRSS is presented in the following Bureau of Reclamation reports: Colorado River Simulation System, An Executive Summary (October 1981); Colorado River Simulation System, Users Manual (June 1982); and Colorado River Simulation System, System Overview (1984).

Table 2
Flow-weighted Average Annual Salinity Concentrations
at Selected Stations

(Total Dissolved Solids in mg/l)^{1/}

Calendar Year	Below Hoover Dam	Below Parker Dam	At Imperial Dam
Numeric Criteria->	723	747	879
1973	675	709	843
1974	681	702	834
1975	680	702	829
1976	674	690	822
1977	665	687	819
1978	678	688	812
1979	688	701	802
1980	691	711	760
1981	681	716	821
1982	680	713	826
1983	658	678	727
1984	597	611	675
1985	556	561	615
1986	517	535	577
1987	517 ^{2/}	538 ^{2/}	613 ^{2/}
1988	537 ^{2/}	559 ^{2/}	655 ^{2/}
1989	582 ^{2/}	594 ^{2/}	682 ^{2/}

^{1/}Determined by the USGS from data collected by Reclamation and the U.S. Geological Survey and published in Quality of Water, Colorado River Basin, Progress Report No. 14, March 1989.

^{2/}Provisional records.

Table 3
Summary of Estimated Water Depletions in the
Colorado River Basin^{1/}

(1,000 acre-feet)

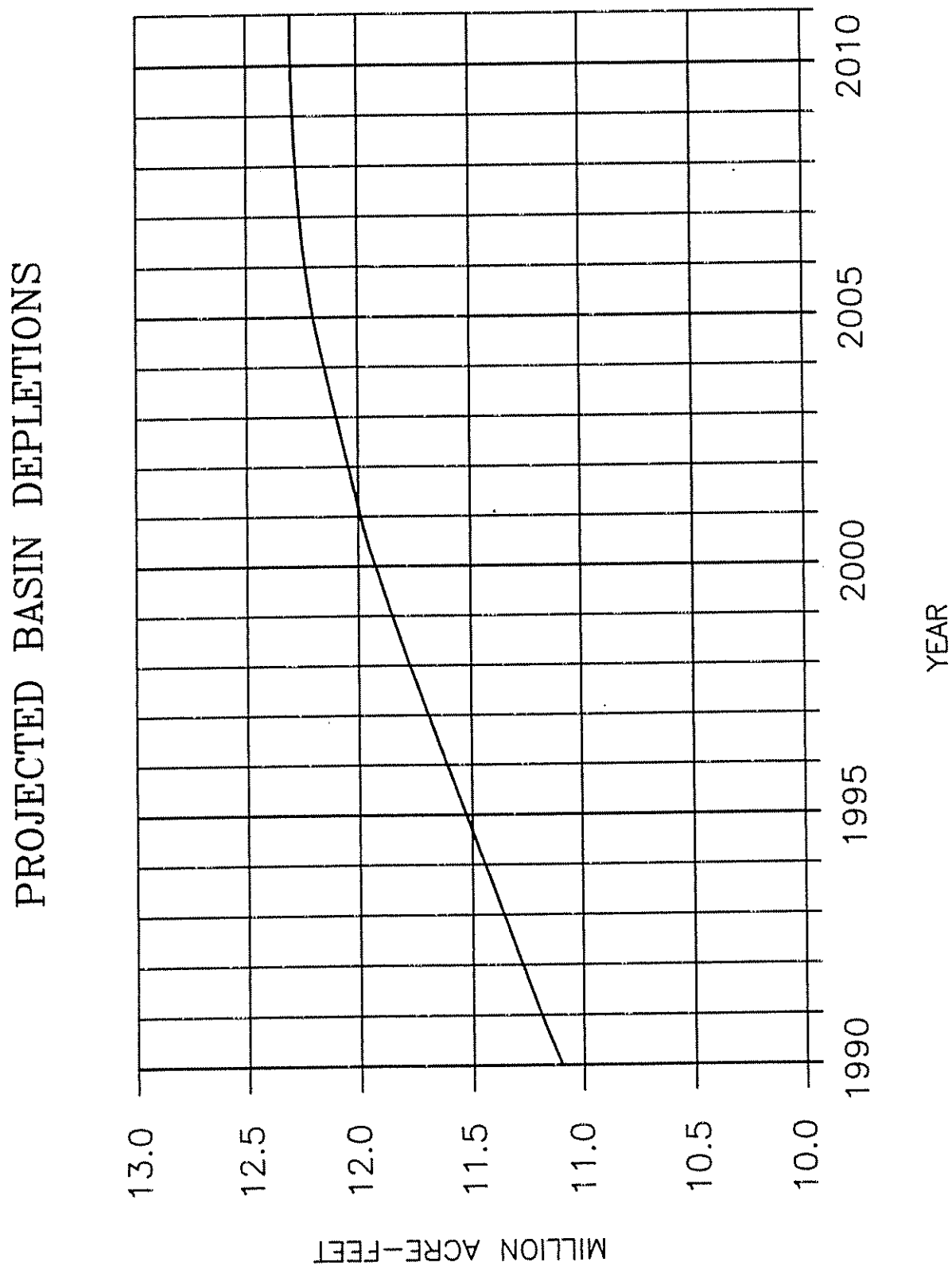
	1990	2000	2010
Upper Basin ^{2/}	3,896	4,508	4,816
Lower Basin ^{3/}	7,500	7,500	7,500
Total	11,396	12,008	12,316

^{1/}Does not include deliveries to Mexico.

^{2/}Depletions at point use. Does not include CRSP reservoir evaporation estimated by Reclamation to average 520,000 acre-feet per year under full development.

^{3/}Lower main stem only. Diversions from the main stem less returns. Does not include main stem reservoir evaporation and stream losses.

Figure 2



The salt routing studies were conducted to provide estimates of future flow-weighted average annual salinity concentrations for each year of the 1990 through 2010 study period at selected points in the Lower Basin using the future water depletion projections described earlier and an average annual long-term water supply of 15 maf.

Projected Salinity Concentrations

Projected 1990, 2000, and 2010 flow-weighted average annual salinity concentrations for Hoover, Parker, and Imperial Dams with existing completed salinity control measures only are presented in Figures 3, 4, and 5.

Future salinity concentrations will depend not only upon human activities but upon natural phenomena, such as runoff conditions, natural evapotranspiration, and precipitation, dissolution, and mixing within the major storage reservoirs. Except for deviations caused by factors beyond human control, average annual salinity levels will be maintained through 2010 at or below the 1972 levels with the recommended plan of implementation.

Baseline Values

The 1975 Forum Report called for the development of baseline values for monitoring points on the main stem and major tributaries of the Colorado River as part of the process of identifying and evaluating changes in river salinity. The baseline values, which are relationships between salt load and flow, were developed and adopted by the Forum in 1980, and are used to assess the effects of development, salinity control measures and/or other activities in the area upstream of the baseline value stations. There is no intent to make baseline values standards nor are they to be considered or interpreted as standards for salinity.

Baseline values were developed for the following thirteen stations in the Colorado River basin³:

- Colorado River near Cameo, Colorado
- Gunnison River near Grand Junction, Colorado
- Colorado River near Cisco, Utah
- San Juan River near Archuleta, New Mexico
- San Juan River near Bluff, Utah
- Colorado River at Lees Ferry, Arizona
- Duchesne River near Randlett, Utah

³ A description of the purpose and methodology for developing these values and the values themselves can be found in the Baseline Value Report which was adopted by the Forum on September 11, 1980, and which is summarized in the 1981 Review.

PROJECTED SALINITY CONCENTRATIONS
BELOW HOOVER DAM
(With Existing Salinity Control Units Only)

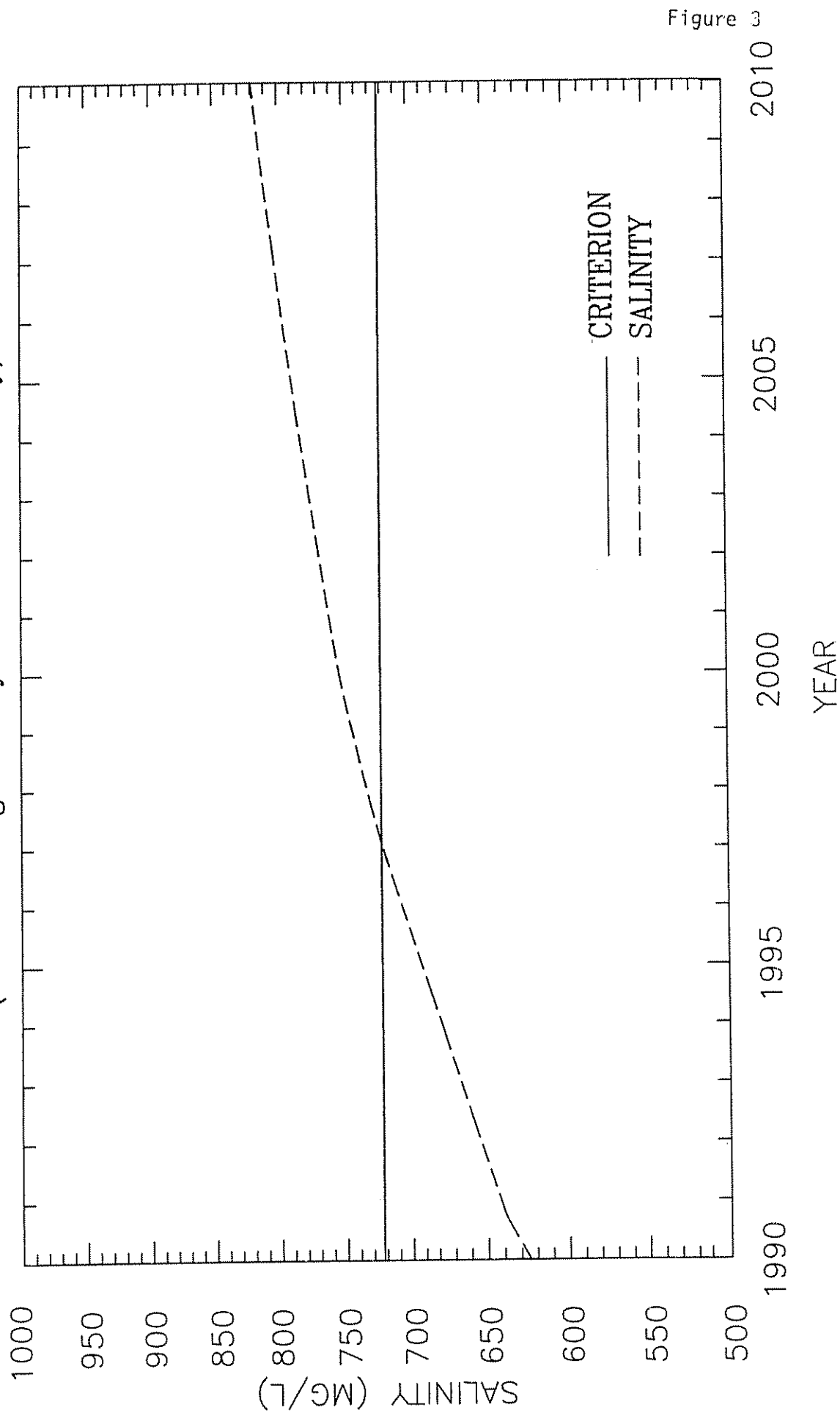


Figure 3

PROJECTED SALINITY CONCENTRATIONS BELOW PARKER DAM (With Existing Salinity Control Units Only)

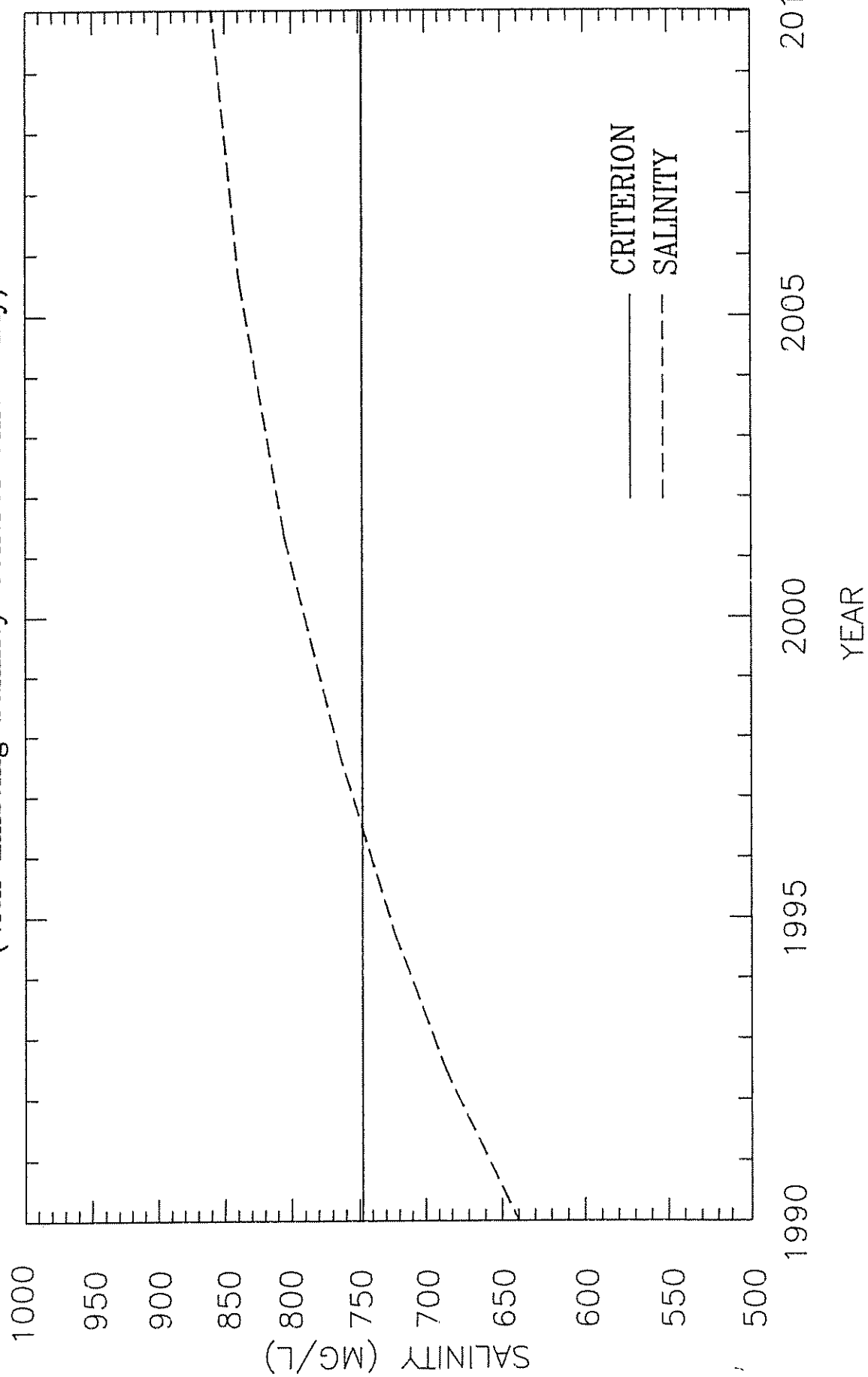


Figure 4

PROJECTED SALINITY CONCENTRATIONS
AT IMPERIAL DAM
(With Existing Salinity Control Units Only)

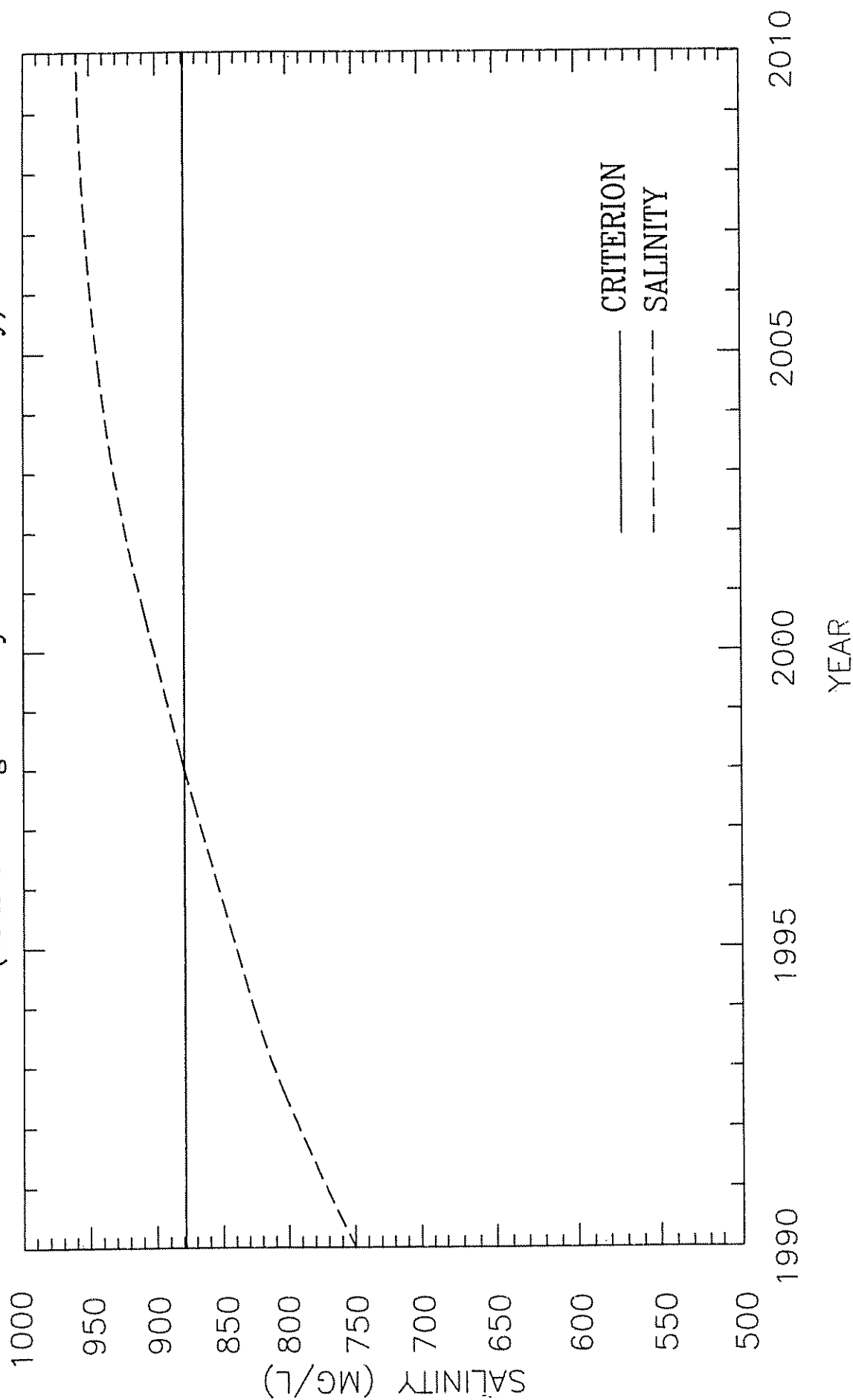


Figure 5

Green River near Green River, Wyoming
Green River at Green River, Utah
San Rafael River near Green River, Utah
Dolores River at Cisco, Utah
White River at Watson, Utah
Virgin River at Littlefield, Arizona

For six baseline value stations the 1986 salinity level fell below the adopted range; for three stations, the 1987 salinity fell below; and for two stations, the 1988 level fell below the lower limit. The Forum believes that this resulted from dilution caused by high flows, and no further investigation is contemplated.

The 1986 salinity level for White River near Watson fell slightly above the adopted range of baseline values, but 1987 and 1988 levels were within the range. No further investigation will be made. The value for the remaining stations fell within the adopted range of two standard deviations.

CHAPTER III - WATER QUALITY STANDARDS FOR SALINITY

Criteria

The Forum developed and agreed upon basinwide water quality standards for salinity, including numeric criteria and a plan of implementation for salinity control in 1975 (1975 Forum report). The standards were pursuant to federal regulations published in the Federal Register on December 18, 1974. In order to provide for sound water quality objectives, based on a basinwide approach, numeric criteria were established at three key stations (below Hoover, below Parker, and at Imperial Dams).

The key stations were selected due to their proximity to major diversions in the Lower Basin. The State of Nevada diverts Colorado River main stem water from Lake Mead for municipal and industrial uses in the Las Vegas area. The Metropolitan Water District of Southern California and the Central Arizona Project divert water from Lake Havasu for all uses. The large agricultural areas in the Imperial and Coachella Valleys in California and the Yuma area in Arizona and California are served by diversions at Imperial Dam.

The flow-weighted average annual salinity for the year 1972, as determined by Reclamation from daily flow and salinity data collected by the USGS and Reclamation, were selected as the numeric criteria. EPA published regulations in 1974 stating "The flow-weighted average annual salinity in the lower main stem of the Colorado River System is to be maintained at or below the average value found during 1972." The states adopted the EPA regulation. There is no inference that 1972 represents a typical or average year. The average daily flow of the river past each of these three measuring points is determined, and the average concentration of salts in the water in milligrams per liter (mg/l) is also determined each day at each of these three measuring points. Each average daily flow is then multiplied by the daily salinity concentrations, resulting in a flow/salinity mass number. For all 365 days of the year, the daily mass numbers are added together, resulting in an annual mass number. The sum of average daily flow (in cfs) of the river past the gage for the entire year is also calculated. The total mass number is then divided by the sum of each average daily flow for the year, and the resulting figure is the flow-weighted average annual salinity for the calendar year at that station⁴.

It should be noted that in conformance with the 1974 regulations, 1972 was the year upon which to base the standards. The numeric criteria are as follows:

⁴ See Appendix B, Forum letter to EPA dated February 26, 1990, and EPA Regulation 40 CFR, Part 120.

Below Hoover Dam	723 mg/l
Below Parker Dam	747 mg/l
Imperial Dam	879 mg/l

Each of the Basin states adopted the standards for salinity as presented in the 1975 Forum report. The state-adopted water quality standards were subsequently approved by EPA.

In response to Section 303(c) of the Clean Water Act, the Forum in 1978, 1981, 1984, and 1987 reviewed the standards. After each review, the Forum determined that the 1975 criteria did not need to be revised. The Forum also reviewed and modified the plan of implementation in 1978, 1981, 1984, and again in 1987 to reflect changes in salt removal requirements to maintain the criteria.

In 1990, the Forum, in response to Section 303(c), again reviewed the numeric criteria and determined that they did not need to be revised. The plan of implementation was also reviewed and modified to reflect changes that have occurred since 1987. The plan is described in Chapters IV and V.

Temporary Increases

The plan of implementation as set forth in this Review is designed to remove enough salt from the river system to maintain salinity levels at or below the 1972 levels as far as it may be determined that development and/or man's activities have impacted the salinity levels. The program is not, however, intended to counteract the salinity fluctuations that are a result of the highly variable annual flows (natural variations in the hydrologic cycle). The plan of implementation for this review is based on the assumption of a long term mean water supply of 15 maf/yr, as were the 1975 Report and all subsequent Reviews.

It should be recognized that the river system is subject to highly variable annual flow. The frequency, duration, and availability of carryover storage greatly affect the salinity of the lower main stem and, therefore, it is probable that salinity levels will exceed the numeric criteria in some years and be well below the criteria in others. Given the above assumptions, the average salinity will be maintained at all times at or below 1972 levels.

Periodic increases above the criteria as a result of reservoir conditions or periods of below long-time average annual river flow also will be in conformance with the regulation. With satisfactory reservoir conditions and when river flows return to the long-time average annual flow or above, concentrations are expected to be at or below the criteria level.

As shown in Figure 2, Chapter 2, the flow-weighted average annual salinity concentrations can fluctuate greatly. Recent analyses have shown that the impact of natural variations in the

hydrologic cycle can have a significant impact on salinity⁵. These natural variations in runoff can cause a fluctuation in average annual salinity concentration of over 300 mg/l TDS at Imperial Dam. By contrast, the plan of implementation, as set forth in this Review, will reduce the average salinity concentration by approximately 100 mg/l at Imperial Dam by 2010.

The federal regulations provide for temporary increases above the 1972 levels if control measures are included in the plan. Should water development projects be completed before control measures are identified or brought on line, temporary increases above the criteria could result and these increases will be in conformance with the regulation. With completion of control projects, those now in the plan or those to be added subsequently, salinity would return to or below the criteria level.

Uses and Associated Impacts of Salinity

The Colorado River, from its headwaters in the Rocky Mountains to its mouth in the Gulf of California, is utilized for a wide variety of purposes. A portion of the flow is transported out of the Colorado River basin for use in adjacent river basins. In the Colorado River basin, irrigation, municipal and industrial, powerplant cooling, fish and wildlife, and recreation are the major uses of river water.

Colorado River water users in the Lower Basin have suffered significant economic impacts due to long-term continued use of water with elevated salinity levels. These damages are estimated to have reached over \$300 million per year under current salinity concentrations. If the proposed plan of implementation for salinity control, as set forth in this Review, is not implemented these damages could triple by 2010.

Agricultural water users suffer from higher salinity waters through reduced crop yields, added labor costs for irrigation management, and added drainage requirements. The urban user incurs additional cost due to more frequent replacement of plumbing and water using appliances, use of water softeners and the purchase of bottled water. Industrial users and water treatment and waste water utilities incur reductions in the useful life of system facilities and equipment from increased levels of salinity.

A significant impact in the Lower Basin is that imposed by local and regional water quality standards and management programs, to protect local ground water supplies. Regulatory agencies have placed restrictions on the reuse of, or recharge of, waters that exceed specified salinity levels. If the river's salinity continues to increase, these regulatory actions would result in

⁵ Progress Report No. 14, Quality of Water, Colorado River Basin, January 1990, USBR

additional expensive treatment of water prior to reuse or the disposal of such waters. If disposal options are selected, additional costly alternative sources of water must be developed or imported to meet the demands previously met or that could be met by water reuse.

To date, salinity activities have been directed toward decreasing total dissolved solids and the impacts on the basin's water users. Salinity is composed of a number of individual constituents, each of which has different impacts on specific beneficial uses. Future research efforts would be needed to address the impacts of individual constituents on specific beneficial uses.

Salinity Monitoring Points

The salinity control plan includes a water quality monitoring and analysis program that provides information on a basinwide basis for plan evaluation. The monitoring and analysis program provides an essential database for future studies, supports state and regional planning activities, and provides an objective basis in evaluating the effectiveness of salinity control measures.

River monitoring stations maintained by the USGS that are used for monitoring the salinity control program are shown on Figure 6. Data collection at these stations include: streamflow, specific conductance, and periodic sampling for dissolved solids concentration. In addition to those stations shown in Figure 6, the USGS maintains monitoring stations that are used to analyze the impacts of individual salinity control projects. Further evaluation by the USGS is needed to assess both the spatial and temporal adequacy of the monitoring system.

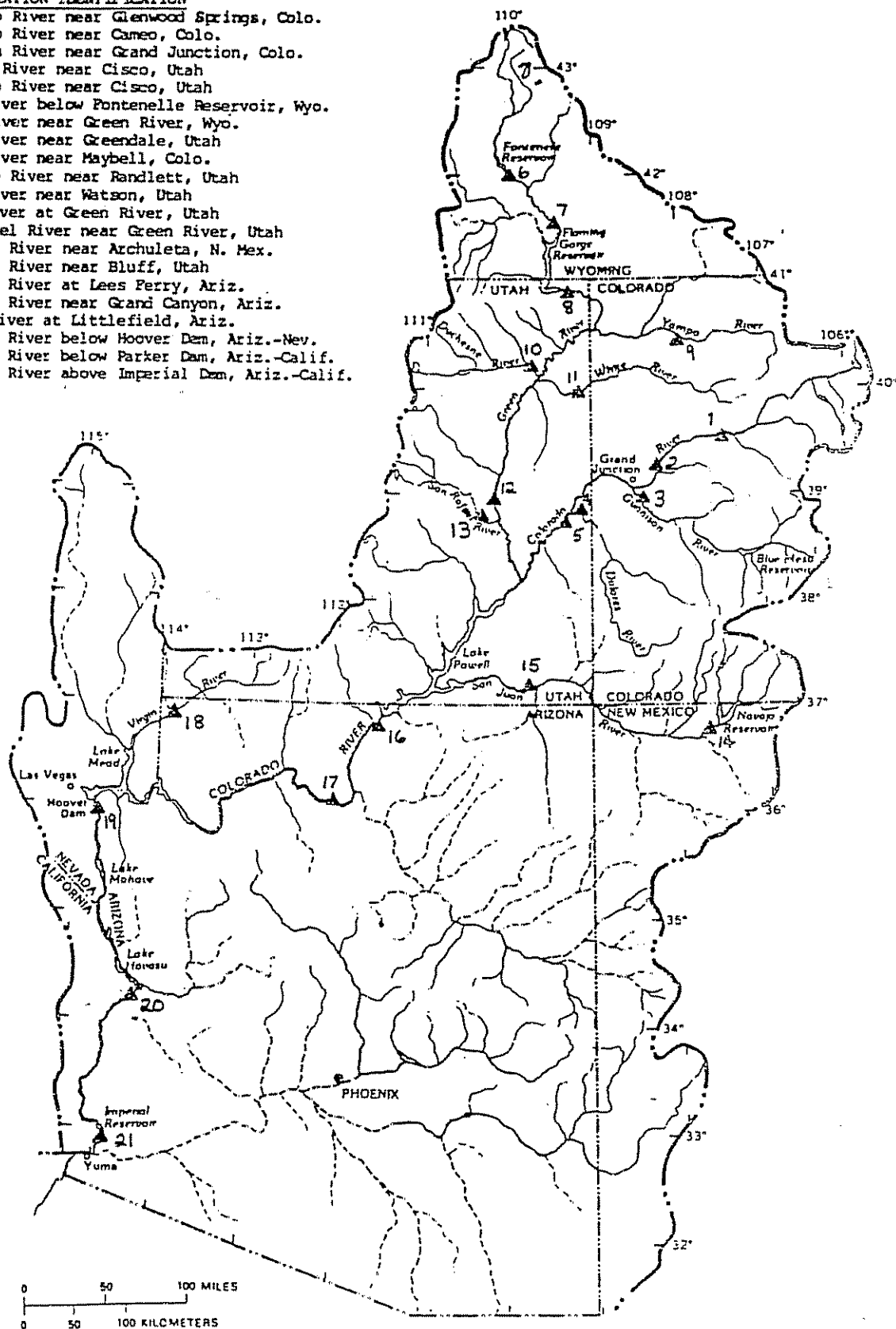
Some of the Basin states also maintain monitoring networks. As an example, the Utah Bureau of Water Pollution Control maintains 27 stations in the Colorado River basin. Water from these sites is sampled bimonthly and analyzed for chemical constituents, nutrients, 5-day biochemical oxygen demand, suspended solids, dissolved solids, and coliform. In addition, continuous recordings of temperature and specific conductance are taken at seven stations in Utah.

Figure 6

MONITORING POINTS

STATION IDENTIFICATION

1. Colorado River near Glenwood Springs, Colo.
2. Colorado River near Cameo, Colo.
3. Gunnison River near Grand Junction, Colo.
4. Dolores River near Cisco, Utah
5. Colorado River near Cisco, Utah
6. Green River below Fontenelle Reservoir, Wyo.
7. Green River near Green River, Wyo.
8. Green River near Greendale, Utah
9. Yampa River near Maybell, Colo.
10. Duchesne River near Randlett, Utah
11. White River near Watson, Utah
12. Green River at Green River, Utah
13. San Rafael River near Green River, Utah
14. San Juan River near Archuleta, N. Mex.
15. San Juan River near Bluff, Utah
16. Colorado River at Lees Ferry, Ariz.
17. Colorado River near Grand Canyon, Ariz.
18. Virgin River at Littlefield, Ariz.
19. Colorado River below Hoover Dam, Ariz.-Nev.
20. Colorado River below Parker Dam, Ariz.-Calif.
21. Colorado River above Imperial Dam, Ariz.-Calif.



CHAPTER IV - PLAN OF IMPLEMENTATION - FEDERAL PROGRAMS

Introduction

The plan of implementation is designed to maintain the salinity concentration of the river at or below the numeric criteria, principally by reducing the salt contribution to the river from existing sources and minimizing future increases in salt load caused by man's activities. The control measures are selected on the basis of cost-effectiveness, technical feasibility, social and political acceptability, and environmental considerations. The plan, if implemented as shown on Figure 7, will maintain the numeric criteria as defined in Chapter 3.

The plan of implementation consists of:

1. Completion of the Reclamation, BLM, and USDA salinity control measures shown in Table 4 and Figure 7, to the extent that each unit remains viable and appropriately cost-effective.
2. Imposition of effluent limitations, principally under the National Pollutant Discharge Elimination System (NPDES) permit program provided for in Section 402 of the Clean Water Act of 1977, on industrial and municipal discharges, based on the Forum's 1977 policy on salinity control through NPDES permits by implementation of the Forum-recommended "Policy for Implementation of Colorado River Salinity Standards Through the NPDES Permit Program" (Appendix A).
3. Implementation of the Forum-recommended "Policy for Use of Brackish and/or Saline Waters for Industrial Purposes" (Appendix A).
4. Implementation of the Forum-recommended "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program for Intercepted Ground Water" (Appendix A).
5. Implementation of the Forum-recommended "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program for Fish Hatcheries" (Appendix A).
6. Implementation of nonpoint source management plans developed by the states and approved by EPA.

Table 4
Recommended Salinity Control Plan
Implementation Schedule 1990-2010

	<u>Begin</u> <u>Implemen-</u> <u>tation</u>	<u>Projected</u> <u>Date</u> <u>Complete</u>	<u>Tons/yr</u> <u>Removed</u> <u>Jan 1990</u>	<u>Projected</u> <u>Salt Removed</u> <u>Tons/yr</u>
Meeker Dome (USBR)	Complete	1983	48,000	48,000
Las Vegas Wash Pittman (USBR)	Complete	1985	3,800	3,800
Grand Valley Stage One (USBR)	Complete	1984	21,900	21,900
BLM well plugging & nonpoint	Complete	1986	8,000	8,000
Grand Valley (USDA)	1979	2010	36,400	163,000
Uinta Basin (USDA)	1980	2010	36,400	98,200
Grand Valley Stage Two (USBR)	1985	1997	25,600	115,600
Lower Gunnison 1 (USDA)	1989	2010	700	82,100
Big Sandy River (USDA)	1988	2006	2,700	52,900
Paradox Valley (USBR)	1988	1994		180,000
McElmo Creek (USDA)	1990	2007		38,000
Dolores Project (USBR)	1991	1995		23,000
Nonpoint Sources (BLM)	1991	2010		36,000
Glenwood Springs (Private)	1991	1991		73,000
Lower Gunnison Win Wtr (USBR)	1991	1995		74,000
Lower Gunnison 2, Mont. (USDA)	1991	2010		81,700
Lower Gunnison 2, Delta (USDA)	1991	2010		104,700
Moapa Valley (USDA)	1991	2002		19,500
Lower Gunnison 3, (USDA)	1992	2006		12,000
San Juan-Hammond (USBR)	1994	1996		27,700
San Juan-Hammond Portion (USDA)	1994	2007		12,500
Uinta Basin I (USBR)	1994	1999		25,500
Price-San Rafael (USBR)/(USDA)	1994	2010		162,900
			<hr/> 185,300	<hr/> 1,464,000 <u>1/</u>
Units under consideration, but currently not in the plan			Units Investigated, but no longer being considered	
Lower Virgin River (USBR)			Dirty Devil River (USBR)	
Sinbad Valley (USBR)			LaVerkin Springs (USBR)	
Mancos Valley (USDA)			Palo Verde Irrigation District (USBR)	
Lower Gunnison Stage I Balance (USBR)			Grand Valley II Balance (USBR)	
Lower Gunnison North Fork (USBR)				
Virgin Valley (USDA)				

1/ Reduction to maintain the numeric criteria through 2010.

Recommended Plan of Implementation
Implementation Schedule 1990-2010
(Based on \$609 million Program) 1/

Projects	90	91	92	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	2010
Grand Valley (USDA) 2/ Uinta Basin (USDA)	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
Grand Valley Stage Two (USBR)	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx
Lower Gunnison 1 (USDA)	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx
Big Sandy (USDA)	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx
Paradox Valley (USBR)	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx
McElmo Creek (USDA) 3/ Dolores Project (USBR)	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx
Nonpoint Sources (BLM)	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----
Glenwood Springs (Private)	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----
Lower Gunnison Wmtr Watr (USBR)	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx
Lower Gunnison 2, Mont. (USDA)	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----
Lower Gunnison 2, Delta (USDA)	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----
Lower Gunnison 3, (USDA)	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----
Mosapa Valley (USDA)	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----
San Juan-Hammond (USBR)	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----
San Juan-Hammond (USDA)	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----
Uinta Basin I (USBR)	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----
Price-San Rafael (USBR)/(USDA)	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----	xxxxxx	-----

1/ Information based on 1989 data

2/ "x" designates construction activities

3/ " |-----|" designates advance planning activities for Reclamation
and technical assistance activities for USDA

Units Completed Under the Program	Units Under Consideration	Units investigated but No longer being considered
Meeker Dome (USBR)	Sinbad Valley (USBR)	Dirty Devil River (USBR)
Grand Valley Stage I (USBR)	Mancos Valley (USDA)	LaVerkin Springs (USBR)
Las Vegas Wash, Pittman (USBR)	Lower Gunnison Stage I Balance (USBR)	Palo Verde Irrigation District (USDA)
BLM well plugging and nonpoint	Lower Gunnison North Fork (USMT)	Grand Valley Stage II Balance (USBR)
	Virgin Valley (USDA)	Lower Virgin River (USBR)

Figure 7

Federal Programs

In the authorizing legislation for the Colorado River Storage Project (Public Law 84-485), the San Juan Chama and Navajo Indian Irrigation Projects (Public Law 87-483), and the Fryingpan-Arkansas Project (Public Law 87-590), Congress directed the Secretary of the Interior to study the quality of water of the Colorado River system and to investigate all possible means of improving the quality of such waters. In partial response to this direction, Reclamation has published 14 biennial reports which summarize the existing water quality conditions in the basin including projections of future conditions.

An additional response to the Congressional direction on Colorado River water quality was the initiation in 1971 of the comprehensive Colorado River Water Quality Improvement Program (CRWQIP). The intent of this program is to investigate the means by which salinity control objectives would be achieved.

By reference to the recommendations of the Seventh Session of the Conference in the Matter of Pollution of the Interstate Waters of the Colorado River and Its Tributaries (1972), Title II of Public Law 93-320 directs the Secretary of the Interior to expedite the investigation, planning, and implementation of the salinity control program defined by the CRWQIP.

Public Law 93-320 also established the program objective of treating salinity as a basinwide problem to be solved in order to maintain salinity concentrations at or below 1972 levels in the lower main stem of the river while the Basin states continue to develop their Compact-apportioned waters. Specifically, the Act authorized the construction, operation, and maintenance of four salinity control projects (Paradox Valley, Grand Valley, Las Vegas Wash, and Crystal Geyser units) and the expeditious completion of planning reports on 12 other projects listed below:

Irrigation Source Control

- Lower Gunnison Basin Unit
- Uinta Basin Unit
- Colorado River Indian Reservation Unit (deferred)
- Palo Verde Irrigation District Unit

Point Source Control

- LaVerkin Springs Unit
- Lower Virgin River Unit
- Glenwood-Dotsero Springs Unit

Diffuse Source Control (non-point source)

- Price River Unit
- San Rafael River Unit
- Dirty Devil River Unit

McElmo Creek Unit
Big Sandy River Unit

The Secretary of the Interior, Secretary of Agriculture, and Administrator of the Environmental Protection Agency were directed to cooperate and coordinate their activities to meet the program objectives.

Public Law 98-569 was signed into law on October 30, 1984, and amends Public Law 93-320. This law modifies the original salinity control program by authorizing construction of additional units and by directing the Secretary of Agriculture to establish a major voluntary onfarm cooperative salinity control program. Crystal Geyser was de-authorized by this law because of poor cost effectiveness.

The passage of Public Law 98-569 provides a separate authority for implementing the basinwide USDA Colorado River Salinity Control (CRSC) program with funds appropriated each year for this program since FY 1987. Prior to 1987, existing program authorities and funding under the Agricultural Conservation Program (ACP) were used to carry out onfarm activities in the Grand Valley, Colorado, and the Uinta Basin, Utah. Those activities are described in earlier reports.

BLM is involved in studies of nonpoint sources from public domain lands in the basin. BLM's activities include watershed improvements and practices and plugging of flowing saline wells.

It should be recognized that some of the salinity control units now in the implementation plan may not prove to be cost-effective or implementable, and other projects and/or salinity control measures will have to be substituted in order to maintain the numeric criteria while the Basin states continue to develop their Compact-apportioned waters. At present there are more salinity control measures identified than have been included in the recommended plan to meet the salinity objectives for the river, thus providing the flexibility to meet changing conditions.

The onfarm salinity control measures being planned and implemented by the USDA are among the most cost-effective measures for salinity reduction. The Forum is encouraging implementation of these measures as rapidly as possible.

Congress directed the Secretary of Agriculture to establish a voluntary and cooperative program to reduce salinity in the Colorado River. The authorizing legislation provides for cost-sharing and technical assistance to land users to plan and install needed salinity reduction practices, including replacement of incidental fish and wildlife values foregone. Land owners volunteer to participate in the program and pay at least 30 percent of the costs to install salinity reduction and wildlife habitat practices.

Bureau of Reclamation/Department of Agriculture

UNITS INCLUDED IN THE PLAN (see Figure 8 for location of units)

Meeker Dome (Reclamation). An oil exploration well known as the Meeker Well was drilled into the localized anticlinal structure known as the Meeker Dome in 1915. This well, located near the bank of the White River 3 miles east of Meeker, Colorado, tapped a supply of warm, salty water (19,000 mg/L) and increased the Colorado River salt load by about 57,000 tons per year. As a result of the well drilling, artesian pressures decreased and many natural springs in the area dried up. In 1968 the Meeker well was plugged by Reclamation, and in a few months other wells and seeps in the area began discharging saline water.

During verification studies, the abandoned Scott, James, and Marland oil wells were cleaned and plugged. After plugging of the three wells, a significant reduction in ground water levels and spring and seep flows occurred, and eventually flows from the springs and seeps ceased. With the plugging of Meeker well, the total salt loading was reduced by 48,000 tons. Cost effectiveness of the reduction of salt load from the three wells is about \$14 per ton. A planning report concluding the study was published in July 1985.

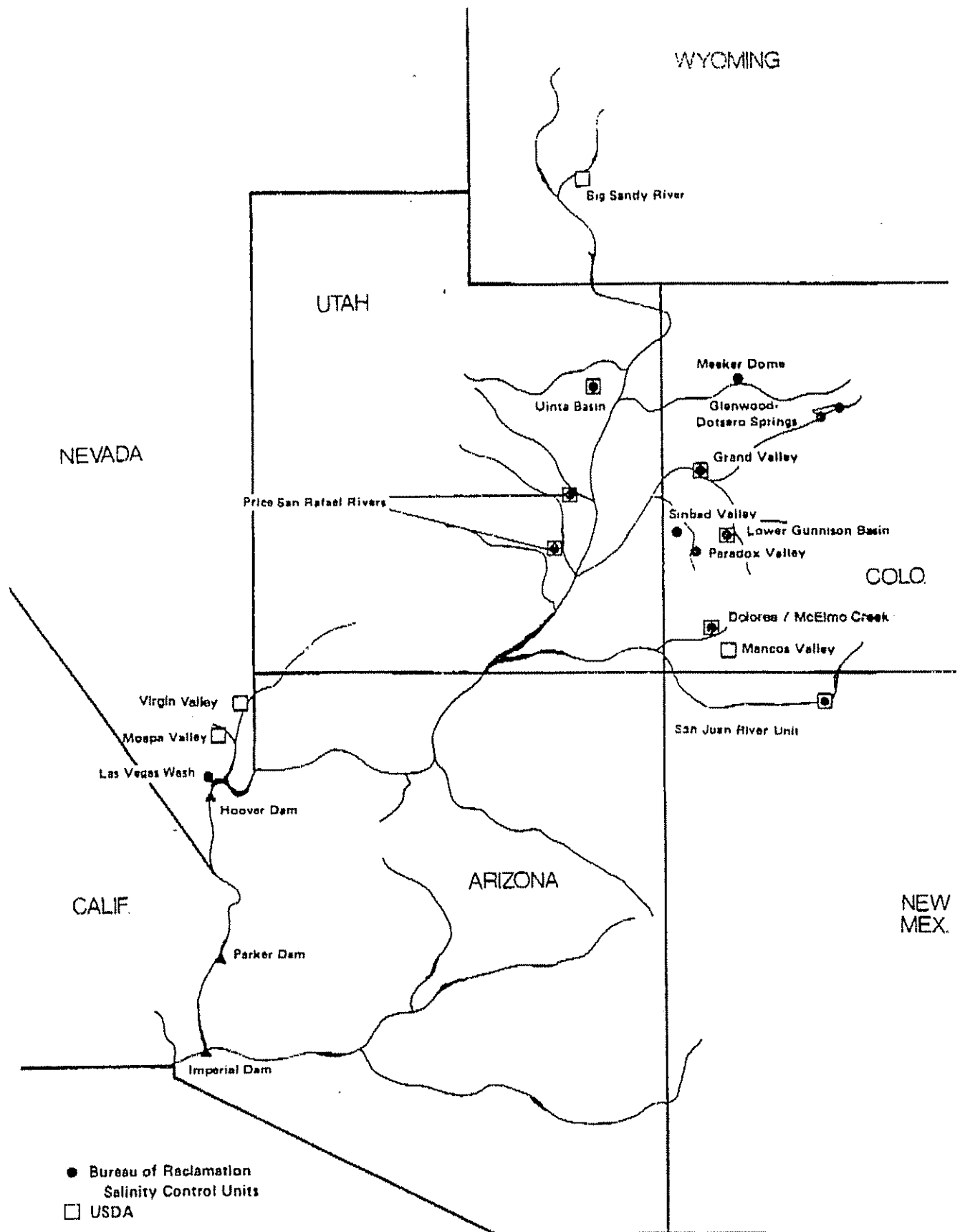
Paradox Valley (Reclamation). Paradox Valley, a collapsed salt anticline, is a northwest-southeast trending valley 3 to 5 miles wide in southwestern Colorado. Local ground water comes into contact with the top of the salt formation where it becomes nearly saturated with sodium chloride and surfaces in the Dolores River channel in Paradox Valley. Studies conducted by Reclamation have indicated that the river picks up over 205,000 tons of salt annually from this saline ground water source as it passes through the valley.

The salinity control plan involves lowering the freshwater-brine interface below the river channel by ground water pumping. The extracted brine would be injected in deep wells in Paradox Valley. About 180,000 tons of salt would be removed annually by this project.

Construction of the brine collection well field began shortly after the Definite Plan Report was issued in January 1979. The well field pump tests confirm that salt pickup by the Dolores River can be significantly reduced by ground water pumping at a rate in the range of 1.0 to 2.0 cubic feet per second (cfs).

The injection test well has been completed to a total depth of about 16,000 feet and fitted with a special, corrosion-resistant injecting tube string. Construction of the brine pipeline, surface treatment building, and the injection building were also completed. The final system shakedown and repairs are underway in 1990. The 2-year injection test is scheduled to begin in the fall of 1990.

Figure 8



Location of Reclamation and Department of Agriculture Salinity Control Measures.

Concurrent to the construction of the surface facilities and after completion of the injection well, contracts were initiated with the Department of Energy and the U.S. Geological Survey to analyze the injection brine and resident formation brine in the well. The studies are to determine if the brines are chemically compatible and what steps might be taken to control compatibility problems. The preliminary results of the studies indicate the potential for compatibility problems. Alternative solutions are being investigated to insure the longevity of the injection well.

Grand Valley Unit (Reclamation and USDA). The Grand Valley Unit in western Mesa County in west-central Colorado includes about 71,000 acres and involves about 200 miles of canals and 500 miles of laterals. Grand Valley contributes an estimated 580,000 tons of salt annually to the Colorado River. Most of the salts are leached from the soil and underlying Mancos Formation by ground water that receives its recharge from canal, lateral, and onfarm seepage.

The Mancos Formation is a thick sequence of gray marine shale varying locally from 4,000 to 5,000 feet thick. Salts present in the shale are mostly calcium sulfate with smaller amounts of sodium chloride, sodium sulfate, and magnesium sulfate. Calcium sulfate (gypsum) is commonly found in crystal form in open joints and fractures in the upper portion of the shale.

Below the soil derived from the shale, the weathered zone of Mancos shale transmits water along open joints, fractures, and bedding planes. Percolating water from irrigation and conveyance system seepage dissolves salts from the weathered shale zone. The excess percolating water and seepage contribute to saline ground water flows that return to the river.

Development of the Grand Valley Unit, by Reclamation, was planned in stages. Stage One, encompassing about 10 percent of the unit area, consisted of concrete lining 6.8 miles of canal, consolidating 34 miles of open laterals into 29 miles of pipe laterals, and installing an automated moss and debris removal structure. This work was completed in April 1983.

To test the effects of Stage One improvements on ground water flows and quality, a hydrologically isolated sub-basin, the Reed Wash study area, was instrumented to monitor surface and ground water inflow and outflow. Salt loading reduction in Stage One from the canal and lateral improvements was determined to be 21,900 tons per year.

Detailed information on surface and ground water inflow and outflow to other selected sub-basins within the unit were collected and used to develop water and salt budgets. In addition, an intensive drilling and aquifer testing program was conducted in both the areas underlain by cobble deposits and in the weathered Mancos shale. The purpose of this program was to determine aquifer

characteristics, such as hydraulic conductivity, as well as to identify quality and direction of ground water flow.

The plan for Stage Two, essentially the remainder of Grand Valley, provides for lining selected canals and laterals. Lining of the West End Government Highline Canal was completed in 1988, preventing 5,600 tons per year of salt from entering the Colorado River. Construction of the associated laterals is well under way. About 17 miles of open ditch was replaced with piped laterals in 1989. Contracts for the installation of an additional 14.2 miles of piped laterals will continue in 1991. When completed, these lateral improvements will reduce salinity by an additional 20,000 tons per year.

Preconstruction activities with the Grand Valley Irrigation Company, Palisade Irrigation District, and Mesa County Irrigation District continued in 1989. These activities included design data collection, negotiations for operation and maintenance contracts, public involvement, and rights-of-way.

Reclamation has purchased more than 500 acres of river bottom lands and more than 500 acres of BLM lands have been transferred to the Colorado Division of Wildlife to develop as a wildlife management area for the project. Reclamation has executed a contract with the Colorado Division of Wildlife for the management of the wildlife lands along the Colorado River, downstream of Fruita, Colorado.

Implementation of the USDA program, initiated in 1979, continued through FY 89 with funds from both the Agricultural Conservation Program (ACP) and Colorado River Salinity Control (CRSC) Program. All carry over ACP funds have now been used and all future activities will be funded through CRSC. As of September 30, 1989, a total of 115 CRSC contracts are in effect obligating over \$3.0 million. Since the program was initiated, approximately 221 miles of pipeline and 54 miles of ditch lining have been installed onfarm. The off-farm improvements amount to 50 miles of buried pipeline and over 11 miles of ditch lining. Major improvements have been made on 1,100 acres of surface irrigation systems, over 3,800 acres have been land leveled, 35 sprinkler systems applied, and 29 drip systems installed. Irrigation water management is being carried out on over 5,000 acres. The total annual salt load reduction as of September 30, 1989 from USDA activities is 36,360 tons.

SCS has placed a wildlife biologist in the Grand Junction field office to provide full-time assistance on the wildlife habitat replacement program. In FY 1989, 19 percent of the new participants volunteered to include wildlife habitat practices in their contracts. To date, approximately 155 acres of wildlife habitat have been established. An extension agent (Irrigation) provides full-time assistance on the information, education and demonstration activities.

Las Vegas Wash (Reclamation). Las Vegas Wash is a natural drainage channel providing the only surface water outlet for the entire Las Vegas Valley. The lower portion is now a perennial stream as a result of waste water effluent and ground water discharges. Flow in the Wash has increased steadily in recent years due primarily to increased sewage discharges resulting from a rapidly growing population. This wastewater carries a salt load of 160,000 tons per year and leaches an additional 90,000 tons of salt per year as the water flows into the Wash.

Over a number of years, Reclamation identified several strategies for reducing salinity in the Wash. However, none of the strategies were cost effective. Reclamation ceased its efforts to develop a salinity reduction program for the Wash.

Prior to discontinuing its efforts, Reclamation constructed a pipeline to convey industrial water discharge in Henderson to the Wash (Pittman). This water was previously released to an open ditch and a portion of the water infiltrated leaching salt on its way to ultimate discharge in the Wash. Confinement of the water to a pipe reduced salt in the Wash by an estimated 3,800 tons a year.

A final planning report on Reclamation salinity control efforts in Las Vegas Wash was completed in September 1989.

Uinta Basin (Reclamation and USDA). The Uinta Basin Unit is in northeastern Utah and includes portions of Duchesne and Uinta Counties and contributes about 450,000 tons of salt annually to the Colorado River System. Return flows from 204,000 acres of irrigated land account for much of the salt contribution.

Reclamation Phase I studies showed the only viable alternative in the study area is canal lining. About 56 miles of the total 240 miles of canals and laterals in the Uinta Basin would be lined. Project implementation would reduce the salt load to the Colorado River by an estimated 21,000 to 30,000 tons per year and reduce canal seepage by about 16,800 acre-feet per year, of which about 4,600 acre-feet could be used to reduce irrigation shortages.

A planning report/draft environmental impact statement on the unit was filed with Environmental Protection Agency and released to the public on April 25, 1986. The final document was completed and filed with the EPA in 1987. Congressional authorization of Uinta Basin Phase I is needed before implementation can proceed.

The Phase II study was completed in 1989. The study evaluated the salinity control potential of areas and opportunities not studied under the Phase I program. The Myton Townsite Canal be included in the planned improvements for the unit. Lining 3.2 miles of the Myton Townsite Canal would remove 2,150 tons of salt at a cost effectiveness of \$90 per ton. The report also recommends evaluating a winter water replacement program alternative in future studies.

Implementation of the USDA program continued through FY 89 with both CRSC and carry-over special ACP salinity funds. All ACP funds have now been used and all future activities will be implemented with CRSC funds which became available in 1987. As of September 30, 1989, 186 CRSC contracts have been signed with participants obligating over \$3.0 million.

Since the salinity program was initiated in 1980, over 403 miles of buried pipeline and 46 miles of concrete lined ditches have been installed and nearly 1,800 acres of land leveled. With major emphasis on the conversion to sprinklers, 600 sprinkler systems have been installed on 5,000 acres. Approximately 178 surface systems have been improved on 12,400 acres. Irrigation water management is being applied on 47,000 acres. The total salt load reduction achieved through 1989 is 36,400 tons per year.

Program participants are installing a variety of wildlife habitat practices including ponds, shallow water areas, wildlife habitat plantings and fencing for management. For FY 90, 60 percent of the applications for salinity contracts include wildlife practices. Wetland and upland habitat management achieved under the salinity control program now totals 4,780 acres. An SCS wildlife biologist is located in the Uinta Basin and provides full-time assistance to the voluntary wildlife habitat replacement program.

Monitoring and evaluation activities indicate that the average irrigation efficiency being achieved is 65 percent. Prior to initiation of the onfarm program, the irrigation efficiencies were about 34 percent.

A full-time Cooperative Extension Service Agent is located in the Uinta Basin and carries out a variety of information and education activities.

Lower Gunnison Basin (Reclamation and USDA). The Lower Gunnison Basin Unit, in the Uncompahgre Valley in west-central Colorado, is principally agricultural, and agribusiness is of primary importance to the local economy. An estimated 360,000 tons of salt are picked up in the study area annually and conveyed to the Uncompahgre, Gunnison, and finally, the Colorado River. The salt pickup is a result of deep percolation of applied irrigation water and conveyance system seepage as water passes through the weathered and fractured shale of the Mancos Formation on its way to drains and the Uncompahgre River.

The implementation plan includes only the Winter Water portion of the Unit which will remove winter flows from canal systems and replace them with a rural domestic water distribution system, reducing the salt load by 74,000 tons per year. Under the proposed construction process, Reclamation will fund the Uncompahgre Valley Water Users Association to construct the on-farm facilities. The Tri-County, Menoken, and Chipeta Water Companies will be funded to construct the off-farm distribution facilities.

The Uncompahgre Valley Water Users Association completed the final inventory of the winter water replacement needs in June 1989. The inventory data will be used by the water suppliers to develop final designs, cost estimates, and construction specifications for off-farm distribution system modifications. This work will also be accomplished under cooperative agreements with Reclamation. Designs for the Tri-County system were done under a \$46,000 cooperative agreement in preparation for fiscal year 1990 construction funding. Designs for the Chipeta and Menoken Water companies will be completed in advance of construction as funds become available.

The USDA onfarm program consists of a full spectrum of onfarm salinity control measures that are compatible with the Reclamation plan. The primary causes of the salt loading are from irrigation delivery system seepage and applied irrigation water percolating through the saline soils. Cost-effective areas were identified for implementation in the Lower Gunnison USDA salinity control plan which was prepared in 1981. The planned salt load reduction from this area is 280,000 tons per year.

The USDA Lower Gunnison salinity control project includes approximately 169,000 acres of irrigated land near Delta and Montrose, Colorado. Because of this large size, the area is divided into 5 subareas for implementation purposes. The Lower Gunnison #1 (Tongue Creek) subarea was selected as the location to begin implementation of the USDA program.

In 1988, CRSC funds were allocated for contracts in the Tongue Creek area and USDA agencies assigned staff to the USDA Service Center in Delta, Colorado, to carry out the program. As of September 30, 1989, farmers have signed 17 CRSC contracts obligating over \$500,000. Interest by local farmers in the program is high with more applications on file than funding is available. As of September 30, 1989, over 5 miles of pipeline and concrete-lined ditch were installed along with other salinity reduction practices such as surge irrigation, gated pipe, and structures for water control. Technical assistance on irrigation water management is also provided to all participants. The practices installed account for a salt load reduction of 700 tons per year.

An SCS wildlife biologist is in Delta and devotes full time to assisting with the planning, installation, and evaluation of wildlife habitat practices. Another SCS wildlife biologist has recently joined the Montrose field office to provide assistance in the Lower Gunnison #2 (Montrose County) project area.

A full-time extension agent (Irrigation) is located in the USDA Delta Service Center to carry out information and education activities.

Big Sandy River (Reclamation and USDA). The Big Sandy River begins in the Wind River Mountains of southwestern Wyoming where the salt content of the water is very low. Below Big Sandy Dam,

water is diverted to irrigate lands in the Eden Project. Irrigation seepage into shallow aquifers near the river are the source of saline seeps. These seeps and springs below the Eden Project contribute about 116,000 tons of salt, and tributaries contribute about 48,000 tons of salt annually to the Green River. Studies indicate that the saline water could be intercepted before seeping into the river.

The State of Wyoming has been involved in the study from the beginning and has provided information, guidance, and funding. It has also supported further funding for advance planning studies.

Early Reclamation studies considered the use of saline water for industrial purposes; however, these alternatives did not prove to be viable. Studies of alternatives calling for the lining of some currently unlined canals in the Eden Project area showed that selective canal lining is not cost effective.

The USDA salinity control program consists of converting the existing onfarm surface irrigation systems to low-pressure sprinkler irrigation systems on 15,700 acres. When fully implemented, the onfarm program will reduce the salt contribution to the river by 52,000 tons per year. Supplemental, low interest loans for the farmers to cover 30 percent cost sharing will be needed. The State of Wyoming has a program to provide local farmers with such assistance.

The final Big Sandy River Unit Environmental Impact Statement was published in 1987 and the Record of Decision issued on January 27, 1988. A new USDA field office was established within the project area at Farson, Wyoming, in 1988 to implement the project. SCS, ASCS and Cooperative Extension Service all have staff in this office and have conducted a local USDA workshop to provide training.

CRSC funds for salinity control contracts have been allocated to this project since 1988. As of September 30, 1989, seven salinity control contracts had been signed with participants obligating approximately \$427,000. To date, four sprinkler systems have been installed on 411 acres and technical assistance is being provided to each participant on irrigation water management. The annual salt load reduction from these actions is about 2,700 tons. Twenty two (22) applications for participation in the program are on file in the field office.

An SCS wildlife biologist is assigned to the Farson office and provides full-time assistance for planning, installation, and evaluation of wildlife habitat.

McElmo Creek/Dolores Project (Reclamation and USDA). Early studies in the McElmo Creek Basin in southwestern Colorado show that salt loading results from both irrigation and other nonpoint sources, with irrigation being the main contributor. The total irrigation diversion into the drainage area averages 105,200

acre-feet per year with an estimated salt load of 119,000 tons per year. Salinity of the irrigation diversion averages 130 mg/L while the outflow from McElmo Creek is about 2,600 mg/L at the Colorado-Utah State line.

The recommended Reclamation plan to reduce salinity is to line four sections of Montezuma Valley Irrigation Company canals (three on the Lone Pine Lateral and one on the Upper Hermana Lateral) and to install laterals from the proposed lined Towaoc-Highline Canal (a Dolores Project feature) to serve the Rocky Ford Ditch service area. The Rocky Ford Ditch would then be abandoned and its flows would be combined into the newly lined Towaoc-Highline Canal. These portions of the McElmo Creek Unit have been authorized for construction as part of the Dolores Project and will reduce salinity by 24,500 tons annually.

The Final Supplements to the Definite Plan Report and Final Environmental Statement were completed, approved and filed on March 24, 1989. The Record of Decision was signed in July 1989.

The construction contract for Reach 1 of the Towaoc Canal was awarded and work will begin in FY 90. A construction contract award for Reach 2 is scheduled for April 1990. The design data packages for Reach 3 and the lateral system on the Ute Mountain lands are complete and awaiting selection of the A&E Design contractor. The design data package for the Rocky Ford Laterals will be submitted in January 1990 with an award scheduled for September 1991. The design package for lining the Upper Hermana Lateral and the Lone Pine Lateral will be submitted in December 1991 with award scheduled for September 1991.

The USDA McElmo Creek Salinity Control report was prepared in 1983 and the Environmental Impact Statement (EIS) was published in 1989. The plan includes provisions for gravity pressure for sprinkler irrigation for 10,400 acres and pumped pressure for 9,300 acres. In addition, improved surface irrigation systems will be installed on 1,850 acres. The plan includes onfarm improvements on a total of 21,550 acres. In 1990, USDA allocated cost-sharing funds for contracts in the McElmo Creek project. USDA staff are in the Cortez, Colorado, field office and implementation activities are underway.

The Reclamation and USBR programs are fully compatible, and a coordinated effort has been made to assure that implementation of Reclamation's delivery and distribution systems will complement design and installation of the onfarm system.

Moapa Valley (USDA). The project covers a 5,000-acre irrigated area on Muddy River upstream of Lake Mead. The project will include installation of 17 miles of underground piped delivery system, onfarm water management, and salinity control practices. By reducing over irrigation and excessive deep percolation, the average annual salt load is expected to be reduced by 19,500 tons.

SCS published its report on Moapa Valley in February 1981 and the draft EIS is scheduled for publication near the end of 1990.

In 1989, the Nevada State Legislature appropriated \$500,000 for implementation, contingent upon matching funds from Clark County and The Muddy Valley Irrigation Company.

Glenwood Springs (Reclamation). The Glenwood Springs Unit is located along the Colorado River in Eagle, Garfield, and Mesa Counties in west-central Colorado. Combined discharges from a number of springs annually contribute approximately 440,000 tons of salt, mostly sodium chloride.

A proposal for a federal-private project at Glenwood Springs has been submitted by Energy Ingenuity and Mission Energy Companies. The proposal calls for a cogeneration project with a 25 MW gas fired generating unit with the waste heat being used for desalting a portion of the Glenwood Springs flows. The proposal would require no funding of construction by the federal government. Reclamation would pay for the removal of and disposal of 73,000 tons of salt annually. Payments would be made at the time of disposal at a unit cost competitive with other salinity control units identified in the plan of implementation. The Forum has recommended that Reclamation move forward with the proposal and has prepared draft legislation for introduction into Congress authorizing the unit.

San Juan River (Reclamation). San Juan River Unit investigation area includes the entire 23,000 square mile watershed from its headwaters in south-central Colorado to its mouth at Lake Powell. The drainage contributes approximately one million tons of salt annually to the Colorado River basin. The study area covers many thousands of square miles of public lands as well as agricultural, municipal, and industrial areas which may contribute controllable salt. Most of the natural source of salt is contributed by surface runoff and ground water discharge from the Nacimiento Formation and Mancos shale. Many thousands of acres of vegetation along the streams and washes contribute to salt concentration. Irrigation projects, coal-fired powerplants, surface mining operations, oil and gas fields, and refinery operations contribute to the river's salinity.

Initial investigations indicate that the Hammond Project, Navajo Indian Irrigation Project (NIIP), and the Hogback Irrigation Project (also a Navajo Indian project) are the principal irrigation sources of salt in the basin, with control on the Hammond Project being cost effective.

In the Hammond area, Reclamation completed its plan formulation activities in 1989 and will begin to prepare a Draft PR/EIS in 1990. The recommended plan proposes to line all unlined sections of the Hammond Project Irrigation system. This would entail concrete-lining 19.5 miles of the Main Canal, 3.9 miles of the Gravity Extension Lateral, 2.3 miles of the East Highline

Lateral, and 1 mile of the West Highline Lateral. The estimated salt load reduction would be 27,700 tons per year at a cost of \$33 per ton (January 1989 prices).

The study was coordinated with the USDA to evaluate combined Reclamation/USDA system alternatives. Due to the high percentage of existing sprinkler systems in the Hammond project and the expense of piping the delivery system, the combined system did not appear to offer a more cost-effective alternative than the recommended plan. Reclamation and the USDA will continue to investigate opportunities to develop combined systems in the area. Construction of the recommended plan will be coordinated with the USDA to assure delivery system compatibility with the USDA onfarm program.

SCS initiated preliminary investigation in 1989 to explore the potential for a USDA onfarm program in the Hammond Project Irrigated area. Investigations indicated that an onfarm program is cost effective and would remove approximately 12,500 tons of salt annually. Planning has been initiated on this project with completion of planning projected near the end of 1991.

Price-San Rafael Rivers (Reclamation and USDA). The Price and San Rafael rivers, in east-central Utah, are 120 miles southeast of Salt Lake City. These rivers drain into the Colorado River via the Green River. An estimated 430,000 tons of salt annually reach the Colorado River from these two river basins. Of this amount, approximately 60 percent is attributed to non-point sources.

The nonpoint source salt loading contributed to the Colorado River from the Price and San Rafael River Basins occurs principally as a result of the dissolution of soluble salts and irrigation returns to the river system as ground water flow.

SCS and Reclamation are preparing a joint plan and EIS for the Price-San Rafael Rivers Unit. Under the joint plan, Reclamation will install salinity control features in the irrigation distribution system and USDA will assist individuals and groups with applying onfarm salinity reduction practices.

The draft planning report/environmental statement is being prepared. Under the preferred plan, salt loading to the Colorado River System would be reduced by about 162,700 tons per year, with an annual cost of salt removal at \$55 per ton (January 1989 prices).

UNITS UNDER CONSIDERATION BUT NOT CURRENTLY IN THE PLAN

Lower Virgin River (Reclamation). This study area is along the Lower Virgin River in northeastern Clark County, Nevada, and northwestern Mohave County, Arizona, and includes evaluation of natural saline ground water averaging 2,400 to 3,400 mg/l along the Virgin River between the town of Riverside and Lake Mead.

Early studies of this unit did not offer a cost effective means of salinity control. A subsequent combined water supply/salinity control project study was completed in 1988. The latest study evaluated Nevada Power Company's plans for construction of the Harry Allen Power Plant. Nevada Power has deferred this project, and further study of this unit by Reclamation has been suspended as no other cost effective salinity control scheme has been identified. A report documenting the studies to date has been completed.

Sinbad Valley (BLM and Reclamation). Sinbad Valley is in western Colorado, south of the town of Gateway. Seeps tributary to Salt Creek which drains Sinbad Valley have been identified as point sources of saline ground water contributing an estimated 5,000 to 8,000 tons per year of salts to the Colorado River System.

The BLM initiated a feasibility study of the interception and disposal of these saline waters during fiscal year 1982 and prepared a report on Sinbad Valley in April 1983. This report identified six alternatives and recommended that lead responsibility and funding be assumed by Reclamation.

Before final selection can be made, additional information is needed. The additional information includes: discharge and conductivity measurements to define salt loads of high flows, onsite evaporation data to further refine the sizing of evaporation ponds for an evaporation alternative, and data on the abandoned wildcat well, No. 1, Sinbad Unit, for suitability for deep well injection of the collected brines. In addition to the technical issues, questions relating to water rights and compatibility of the project with existing land uses must be resolved prior to proceeding.

Mancos Valley (USDA). The report on this 9,200 acre irrigated area along the Mancos River in southwestern Colorado was completed in 1985. The recommended plan includes 3,200 acres of sprinkler systems and other water management/salinity control treatment on about 5,500 total acres. About 17 miles of canal and lateral would be combined and lined to replace many old earthen laterals. Total salt load reductions are estimated to be 8,800 tons per year with about 7,700 tons resulting from lateral improvements.

Virgin Valley (USDA). The area consists of about 5,000 acres of irrigated lands in southern Nevada. The plan includes improvements of about 6 miles of off-farm canals and laterals. Deep percolation reduction for the planned actions is estimated to be 19,000 acre-feet per year and salt load reductions would be 37,200 tons per year.

While the Virgin Valley Unit is not directly associated with any Reclamation salinity control project, the downstream impacts on Reclamation's Lower Virgin River Unit are to be evaluated by Reclamation and SCS collectively. The Virgin Valley report was published in March 1982.

UNITS INVESTIGATED BUT NO LONGER BEING CONSIDERED

A number of salinity control measures have been investigated but they are no longer being considered because the cost effectiveness was extremely poor. These units include: Dirty Devil River, Utah; La Verkin Springs, Utah; Palo Verde Irrigation District, California; and Grand Valley Stage II Balance, Colorado. A description of these units can be found in Quality of Water, Colorado River Basin, Progress Report No. 14, January 1990.

ECONOMIC UPDATE OF SALINITY IMPACTS BY RECLAMATION

A preliminary analysis of economic impacts of salinity was originally started in 1974, resulting in a 1980 published report entitled, Colorado River Salinity - Economic Impacts of Agricultural, Municipal, and Industrial Users by Messrs. Kleinman and Brown. Since this earlier work, many changes have occurred in water use, treatment, materials, equipment costs, etc., that affect present and future salinity damage levels in the Lower Basin.

A contract study was initiated in June 1986 to provide an update and better estimate of present and future damages. The evaluation is based on using existing information. This study focuses primarily on the municipal and industrial water use sectors in the Lower Colorado River Basin. The final report, Estimating Economic Impacts of Salinity of the Colorado River, by Loretta C. Lohman, J. Gordon Milliken, and William S. Dorn, was delivered to Reclamation in February 1988. As a part of the study, a user-friendly computer model to estimate future salinity damages on water users in the Lower Basin was developed.

The study estimated the current total annual salinity damages from the use of Colorado River water in the Lower Colorado River Basin is about \$300 million based on a threshold salinity concentration of 500 mg/l. Preliminary estimates of future annual damages indicates that the damages could triple by the year 2010 if the salinity program is not implemented.

Bureau of Land Management

The BLM administers approximately 40 percent (48 million acres) of the lands in the Colorado River basin above Imperial Dam. Approximately 7.2 million of these acres contain saline soils. Salt concentrations on BLM lands are highest in saline geologic settings, usually marine shales, where annual precipitation averages less than 12 inches. Most salt contributions to the Colorado River occur from nonpoint sources; surface runoff, erosion, and ground water flows.

Public Law 98-569 directed the Secretary of the Interior to develop a comprehensive program for minimizing salt contributions from lands administered by BLM. A report that describes the

program and recommended implementation actions was sent to the Congress in July 1987. The report to Congress, Salinity Control on BLM - Administered Public Lands in the Colorado River Basin, discusses this ongoing activity, outlining BLM's implementation actions concerning salinity control, and quantifying, classifying, and mapping the saline soils on BLM-administered lands. BLM addresses salinity through a two tiered planning processes, Resource Management Plans (RMP's) and Comprehensive Watershed Management Plans. In the RMP stage, salinity problems and issues are identified and general courses of actions are outlined. The RMP outlines salinity control objectives through proper land use management while enhancing other resource values. In the second tier, Comprehensive Watershed Management Plans are developed to implement land management projects and practices. Salinity control on public lands is accomplished through techniques that are cost-effective and provide multiple resource benefits, including structural measures.

NONPOINT SOURCE CONTROL

Controlling salinity in surface runoff from rangelands is closely related to controlling sediment yield. Vegetation cover is the most important management variable influencing runoff and sediment yield on rangelands.

Therefore, vegetation management, either indirectly through the design and implementation livestock grazing management plans (i.e. Allotment Management Plans) or directly through vegetation manipulation, is an important erosion and salinity control technique. However, on the most highly saline public lands, maximum potential cover is often too low to provide meaningful control of surface runoff and erosion. In these areas, controlling disturbance of the land surface, and thus, maintaining natural watershed processes are the best salinity control technique.

Proper land use, with objectives for increasing ground cover, stabilizing stream banks, controlling accelerated gully erosion, and minimizing surface-disturbing activities, is the BLM's preferred method of achieving salinity control. Proper rangeland management, energy and minerals management, and recreation management have the greatest potential for controlling man-caused salinity from public lands.

Where the watershed condition is so severely degraded that recovery will be inefficient under normal land management practices, mechanical land treatments and structural alternatives may be the most effective salinity control techniques. These include contour furrowing, retention dikes, retention and detention reservoirs, and gully plugs. Reservoirs are efficient in controlling salinity by trapping runoff and sediment and should be impermeable to avoid leaking salt through the subsurface.

Surface-disturbance activities associated with oil and gas drill-pad construction, roads, oil exploration seismic trails, and pipelines also increase sediment and salt yields. BLM mitigates surface-disturbing activities within fragile soil and watershed areas to prevent accelerated erosion of saline soils.

Many types of recreation uses occur on public lands. Some of these uses may increase salinity by decreasing ground cover and compacting soil, thus increasing sediment and runoff. Mitigation measures and limitations on the intensity and location of recreation uses to meet salinity control objectives are developed.

POINT SOURCE CONTROL

BLM administers the leasing of all Federally-owned mineral resources. The discharge of excess water from coal mining operations requires a National Pollutant Discharge Elimination System (NPDES) Permit. The Forum policies should be adhered to the issuance of NPDES permits.

Saline waters are also a by-product of oil and gas production. Common disposal techniques include injection and disposal in lined and unlined pits. The approval authority for produced water disposal varies from State to State, with the exception of underground injection which is administered by the State or EPA. The BLM's requirements for production water disposal methods are outlined in Notice to Lessees and Operators of Federal and Indian Oil and Gas Lease No. 2B (NTL-2B). The disposal of production waters in lined evaporation pits requires the operator to periodically dispose of precipitated solids, sample and analyze contained water, specify the type of liner, and provide a leak detection system. If production waters will eventually be discharged to surface streams, a NPDES Permit is required.

Point sources occur as either wells or springs. Several wells have been plugged (see section in Major Salinity Control Accomplishments) and future flowing wells will be plugged as the situation warrants.

SALINITY CONTROL ACCOMPLISHMENTS

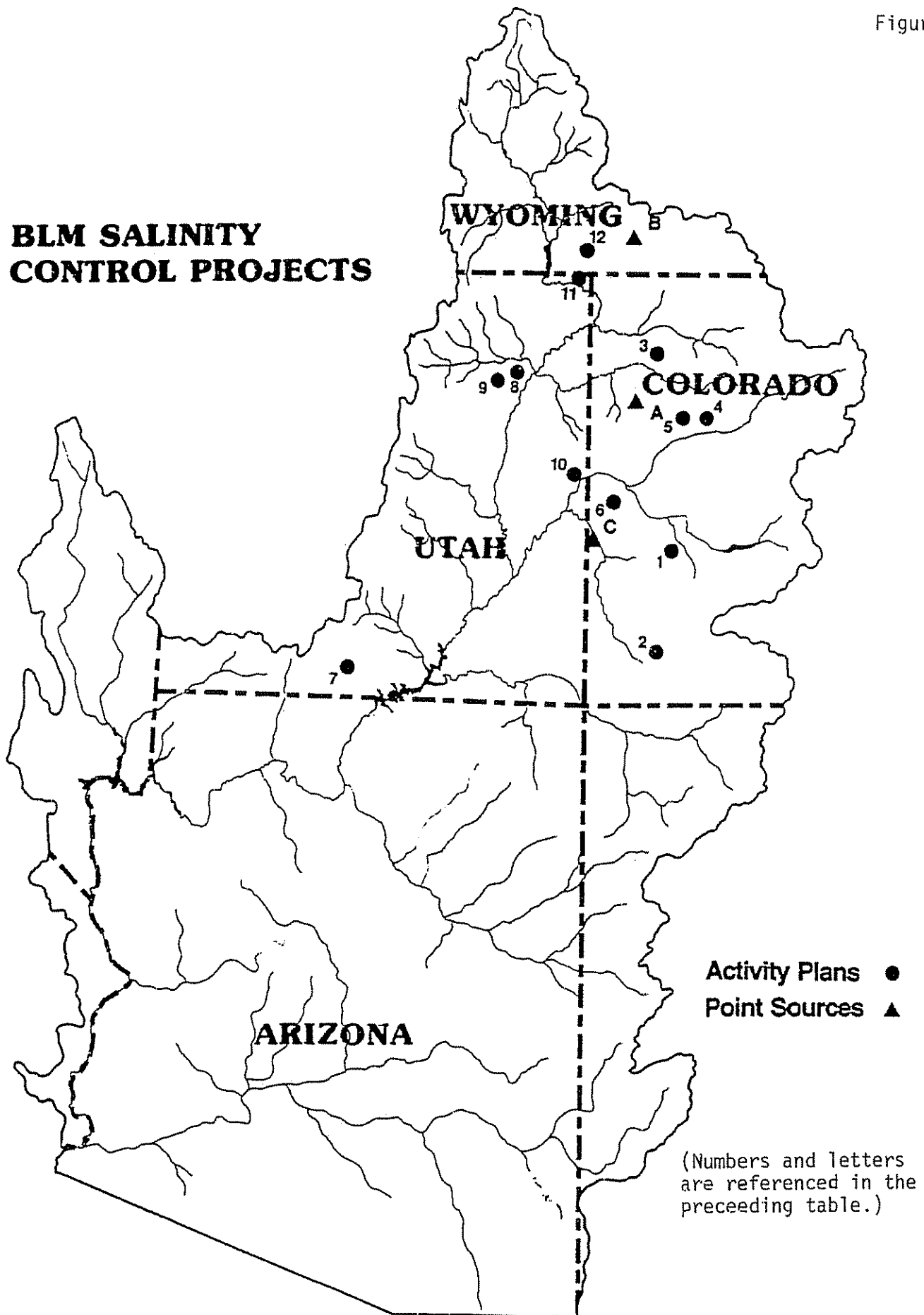
Since 1975, BLM has invested substantially in the study and control of salinity from both diffuse (nonpoint) overland sources and point sources on BLM lands in the Upper Colorado River Basin. In 1983, BLM's emphasis shifted from studies to the identification and implementation of specific salinity control projects. Potential salinity control projects have been identified in Colorado, Utah, and Wyoming. (See Table 5.) The location of projects is shown in Figure 9.

Table 5
Colorado River Basin Salinity Program BLM Projects^{1/}

<u>Project^{3/}</u>	<u>Begin Implemen- tation</u>	<u>Projected date complete</u>	<u>Projected^{2/} total reduction (tons/yr)</u>	<u>Salt re- duction to 10/31/89 (tons/yr)</u>
BLM Well plugging (ABC) and nonpoint	1984	1988	7,000	7,000
Elephant Skin (1) Wash (BLM)	1984	1993	3,000	450
Spring Creek Basin/ (2) Disappointment Valley (BLM)	1986	2010	8,500	200
Lower Wolf Creek (3) (BLM)	1983	1997	3,000	100
Milk and Alkali (4) Creeks (BLM)	1985	1990	500	25
Poison Creek (BLM) (5)	1985	1989	120	120
Grand Valley (BLM) (6)	1971	2010	7,000	1,000
Round Valley (BLM) (7)	---	---	350	---
Castle Peak (BLM) (8&9)	1985	1996	500	345
Sagers Wash (BLM) (10)	1985	---	430	110
Red Creek, UT (BLM) (11)	1983	---	480	395
Muddy Creek, Ordersville, UT (7) (BLM/SCS)	1991	2001	1,390	---
Red Creek, WY (BLM) (12)	1985	2010	500	100
BLM Non-Specific Projects	1985	2010	10,230	2,000

- ^{1/} Project Plan will include Comprehensive Watershed Management Planning and Economic Analysis Procedures.
- ^{2/} Preliminary estimate that is subject to project plan implementation and evaluating progress to account for increases/decreases in salinity from public lands.
- ^{3/} Location of projects is designated by number in parentheses and shown on Figure 9.

Figure 9



Location of Bureau of Land Management Salinity Control Measures.

Fourteen activity plans have been completed and partially implemented. The cost effectiveness for the plans ranges from \$35 to \$60 per ton of salt removed. Total implementation costs of the individual plans may be misleading relative to salinity reduction. Since the plans generally provide multiple resource benefits, the total cost exceeds the cost associated with salinity reduction.

Six flowing saline wells, five in Colorado and one in Wyoming, have been successfully plugged. Approximately 125 sediment retention structures have been constructed in Wyoming, Utah, and Colorado. The total salt yield reduction resulting from the above BLM salinity control projects is approximately 9,800 tons annually, from well plugging, structures, surface-disturbance mitigation measures, and other land management prescriptions.

Fish and Wildlife Service (FWS)

The responsibilities set forth in the Endangered Species Act, Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act and the Migratory Bird Treaty Act, provide for FWS participation in the Colorado River Salinity Control Program. It is mainly through these legislative authorities that the FWS works toward meeting its objective of providing the federal leadership to conserve, protect, and enhance fish and wildlife and their habitat for the continuing benefit of the public.

There is a biological diversity of fish and wildlife resources and a great number of unique species in the Colorado River basin. This river system has one of the largest lists of threatened and endangered fish and wildlife species in the United States as well as significant other resources, including migratory birds and waterfowl, non-migratory birds, big game, wetlands, riparian lands, and other habitats that support wildlife.

In general, FWS activities consist of evaluating salinity control unit proposals and preparing related Fish and Wildlife Coordination Act reports, Planning Aid Memorandums (See Table 6 for status), biological opinions, and commenting on Draft Environmental Impact Statements and biological assessments. The Salt Lake City Field Office has been identified to provide the overall program coordination for the Service.

The FWS has completed Fish and Wildlife Coordination Act reports for eleven salinity control units. Ongoing planning/coordination efforts are proceeding on six of those units.

A Fish and Wildlife Coordination Act report and Biological Opinion will be issued soon on the Price-San Rafael Rivers Unit. Ongoing studies include a new start on the San Juan River Unit.

Fish and Wildlife Service participation in the planning process for the salinity control program is mandated by the Fish and Wildlife Coordination Act. That participation is provided

Table 6
Fish and Wildlife Service Activities
in Salinity Control Studies
1987 - 1990

Project	Fish & Wildlife Coordination Act Status	Report Planning Aid Memo/Letter (PAM/PAL)	Activity
Region 6 - Salt Lake City, Utah			
Price - San Raphael	under preparation		Finalizing Biological Opinion
Paradox Valley	complete	none	Review Reclamation Planning options
Grand Valley	complete	Preparing PAL Price & Stub lateral	Monitoring mitigation acquisition.
Glenwood Dotsero	complete	PAL	Study private development proposal
McElmo Creek	complete		Evaluating HEP Models for on farm impacts
Upper Gunnison/Umcompahgre	complete		Coordination on winter water planning effort
Umcompahgre Retrofit	1990	PAM	New start
San Juan	PAL mid 1990		Wetland delineation underway
Region 1 - Reno, Nevada			
Lower Virgin River	complete		Working with SCS in developing HEP Models

through a variety of planning/working/coordination interactions with Reclamation, SCS, BLM, State water agencies, and Fish and Wildlife resource agencies, Indian tribes and the general public. Lists of threatened and endangered species that may occur in the salinity control project areas are provided by the FWS. Biological opinions are formulated by the FWS for those projects where a threatened or endangered species may be affected.

Salinity program implementation conflicts are occurring because of the anticipated effects of projects on wetlands and endangered fish. These issues must be resolved in order for the salinity program to achieve the salt reduction goals. Communications and cooperation between FWS, SCS, Reclamation, and the states is necessary in order to achieve satisfactory progress.

Geological Survey

The Geological Survey's Water Resources Division provides and analyzes hydrologic information to assess the Nation's water resources. Programs are developed with cooperation and financial support from State, local, and other Federal agencies. The programs provide hydrologic and geochemical information for evaluation of surface and ground water systems as well as for management and policy decisions.

To provide information required by the federal, state, and local agencies to address Colorado River water quantity and quality problems, the Water Resources Division operates and maintains a network of about 520 stream gaging stations and 140 water quality stations in the Colorado River basin. Streamflow and water-quality information from these stations provide input to the hydrologic database for Reclamation's Colorado River Simulation System.

In addition to collecting hydrologic data, the Water Resources Division conducts specific studies on surface water, ground water, and water quality. During the review period, USGS scientists started the Uinta Basin Brine Injection project to investigate the effects of brine injection on ground-water supplies in aquifers less than 1,000 feet below land surface. Also started was the Aneth Ground-Water Salinity Study, which involves the investigation of apparent increasing salinity in the water of the Navajo and other sandstone aquifers in the Aneth, San Juan County, Utah area.

A Dissolved Solids Estimation project was also conducted to estimate dissolved solids and streamflow for periods of missing record and then present monthly values for the period 1935-present for the Colorado River between Imperial Dam and the International Boundary.

Environmental Protection Agency

The major Environmental Protection Agency (EPA) programs relating to Colorado River salinity control are: 1) water quality management planning; 2) National Pollutant Discharge Elimination System (NPDES) Permit; 3) water quality standards; 4) review of National Environmental Policy Act (NEPA) documents; 5) nonpoint source control under Section 319 of the Water Quality Act of 1987; 6) wetlands protection; and 7) the Underground Injection Control (UIC) Program. For the most part, these programs are either implemented by the states under Federal statute (such as the water quality standards program) or delegated to the states by EPA (such as the NPDES program). EPA maintains oversight responsibilities for the assumed and delegated programs, and has responsibility for review and approval of state-adopted revisions to water quality standards, including salinity. EPA continues to encourage the Basin states to develop and implement the basinwide and state salinity control strategies.

EPA-drafted NPDES permits for Federal and Indian facilities in the Colorado River basin must incorporate the requirements set forth in the Colorado River Basin Salinity Control Forum policies.

EPA reviews NEPA documents for both salinity and non-salinity control projects of other agencies. Through review of non-salinity projects, EPA urges the identification of potential salinity impacts, and encourages discussion of mitigation of adverse impacts as required by the Council on Environmental Quality regulations for implementing NEPA (40 CFR Parts 1500-1508). For example, EPA will comment on potential salinity impacts, when appropriate, when reviewing EIS's for grazing and land management, recreational developments, mining, and water development projects. In addition, EPA encourages the development of mitigation measures for adverse impacts to satisfy state and Colorado River Basin Salinity Control Forum policies for salinity control and through Clean Water Act Section 401 certifications for activities subject to federal permitting actions. The Forum policy encouraging the use of higher TDS water for industrial purposes is being supported primarily through NEPA review responsibilities.

Wetland protection is a high priority for EPA. Wetland concerns associated with the salinity program are addressed through NEPA reviews and through continued coordination with the salinity control implementation agencies, the U.S. Fish and Wildlife Service, and state agencies.

Preserving irrigation-induced wetlands and reducing salt loading to the Colorado River present conflicting environmental values. Public Law 93-320 states that the purpose of the salinity control program is to implement actions to reduce the salt load carried by the Colorado River. A portion of the salt load is attributed to seepage and deep percolation from leaking canals and laterals, and poor onfarm irrigation systems and water management. These inefficient irrigation systems and practices are the source

of water for many of the wetlands associated with salinity control units. As seepage from irrigation systems is reduced and irrigation efficiencies improved, some of these irrigation induced wetlands will be unavoidably lost. In contrast, there is a basis for wetland protection and mitigation established in the regulations for compliance with NEPA, Executive Order 11990, and USDA policy. Therefore, the concept of replacing irrigation-induced wetlands and reducing the salt load in the Colorado River presents the conflict between the environmental values of improved water quality and wetland preservation.

USDA advocates replacement of habitat values foregone but has no specific authority other than to strongly encourage voluntary participation to implement fish and wildlife habitat replacement measures. In this regard SCS has assigned a wildlife biologist in each of the salinity control areas. Local land owners are encouraged to and do install replacement practices. Land owners are volunteering to implement wildlife habitat practices and progress is being made. Nevertheless, conflicts continue which affect program implementation. Resolution of these conflicts is difficult and will require even closer communication and cooperation between EPA and USDA agencies.

EPA works with the Basin states to assure that salinity is addressed in the nonpoint source control assessment reports and management programs developed under Section 319. EPA continues to emphasize salinity control through state/local and Federal land management activities, in addition to the Reclamation and USDA salinity units.

CHAPTER V - PLAN OF IMPLEMENTATION - STATE PROGRAMS

Important components of the plan of implementation for salinity control are the Basin states' activities associated with the control of total dissolved solids through the National Pollutant Discharge Elimination System (NPDES) Permit program and the water quality management plans. All states have adopted the 1977 Forum "Policy for Implementation of the Colorado River Basin Salinity Standards through the NPDES Permit Program," and the 1982 "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program for Intercepted Ground Water." Copies of those and the other Forum policies are presented in Appendix A. A preliminary listing of the NPDES permits in force within the Colorado River basin are presented in Appendix C. During the period of this review, the status of implementation of the NPDES permits and the water quality management plans in each of the states is as follows.

Arizona

NPDES Permits

Authority for issuing NPDES permits has not been delegated to the state and still resides in the Region IX office of EPA. Arizona is currently operating under an "interim" plan in which the state prepares the permit, solicits public comments and involvement, and forwards the final draft to EPA for approval and issuance.

Arizona, in drafting NPDES permits for industries throughout the Colorado River basin within the state above Imperial Dam, follows the Forum's policy regarding salinity control. Reuse of treated wastewater is encouraged as a general principle.

Presently three industries (two of which are uranium mineral) discharges to tributaries of the Colorado River above Imperial Dam. There are also 31 municipalities or quasi-public permittees in the watersheds of Arizona above Imperial Dam.

The Department of Environmental Quality annually reviews monitoring reports of facilities potentially discharging under NPDES permits. No system is discharging more than one ton per day or 350 tons per year of TDS; and in most cases discharges are to ephemeral tributaries which are remote from the mainstream of the Colorado River.

Water Quality Management Planning

The Northern Arizona Council of Governments is the designated area-wide water quality planning agency for the Colorado River and its tributaries in the northeast and north central parts of the state, while the Western Arizona Council of Governments has similar

responsibilities for Mohave, La Paz, and Yuma Counties. Agricultural best management practices and implementation of policy for industrial uses of brackish/saline water offer the best opportunity for salinity control. Further, they are consistent with the Forum's plan of implementation for salinity control.

Other Activities

In 1986, the Arizona State Legislature adopted a new Environmental Quality Act (H.B. 2518). The Act established a new Department of Environmental Quality on July 1, 1987. The water quality staff of the Department is developing programs to protect the quality of both surface and ground water, including point source and nonpoint source management, permitting, and pesticides management. The State Nonpoint Source (NPS) Water Quality Assessment and Management Plan reports have been approved by EPA and demonstration projects are being evaluated. The State NPS Management Plan provides for consistency reviews in accordance with Section 319(k) of the federal Clean Water Act. Consistency reviews provide an effective mechanism for states to ensure proposed projects and programs contribute to improved water quality management. Categories of projects and programs related to salinity control include irrigation systems, salinity control projects impoundments, diversion, and rangeland management.

California

NPDES Permits

The California Regional Water Quality Control Board, Colorado River Basin Region, issues the NPDES permits for navigable waters and waste discharge requirements for land discharges within the Colorado River drainage portion of the state. In issuing and reissuing waste discharge requirements, the Regional Water Quality Control Board complies with all Forum policies. In addition, the Regional Board has included in the discharge permit requirements for land discharges a prohibition of brine backwash from water softeners into evapo-percolation ponds which overlie ground waters which are in hydraulic continuity with the Colorado River System. Industrial discharges are to be confined in impervious evaporation basins.

Water Quality Management Planning

The Water Quality Control Plan for the combined East and West Colorado River basin was adopted by the California Regional Water Quality Control Board in November 1984. Following public hearings, the updated plan was adopted by the Regional Water Quality Control Board and approved by the State Water Resources Control Board in February 1985 and by EPA in September 1985. The salinity control component of the water quality plan is consistent with the Forum's

plan of implementation for salinity control. The Regional Water Quality Control Board is working with the Forum and local entities to insure that implementation of the water quality plan is achieved.

Other Activities

A policy establishing priorities for the use of poor quality waters for cooling of inland power plants has been in effect since 1975. The State Water Resources Control Board has included salinity control in the Colorado River among its top priority items.

Colorado

NPDES Permits

Administration of the NPDES permit program was delegated to the State of Colorado, Water Quality Control Commission (WQCC), by the EPA in May, 1978. The Commission's regulation for implementation of the Colorado River Salinity Standards reflect all of the Forum policies adopted to date. All existing, new or reissued permits require compliance with this regulation.

Currently, there are 380 NPDES permits in the Colorado River basin portion of the state and they are almost evenly divided between municipal and industrial facilities. Of this total, there are 13 major or significant minor industrial permits and 21 major or significant minor municipal permits.

Colorado is continuing to insure that the Forum's policies are implemented through the WQCC regulations. Monitoring is in place for all permits in the basin. Industrial and Municipal permittees who cannot meet the Forum's policies of no salt return or the 400 mg/l incremental increase are required to conduct studies to demonstrate that meeting these standards is not practicable.

Water Quality Management Planning

In the Colorado River basin of Colorado there are four water quality planning regions (9, 10, 11, and 12). Table 7 indicates the counties within each planning region and describes the status of the Water Quality Management Plans for each region. The State of Colorado has direct responsibility for water quality management planning in regions 9 (San Juan) 10, and 11 (Colorado West). In Region 12, the Northwest Colorado Council of Governments (NCCOG) has responsibility for water quality planning.

Table 7
State of Colorado - Department of Health
Colorado River Basin Water Quality Planning Summary

Planning Region	Counties	Date of Initial 208 Plan	Date of Last Update	Date of Last Governor's Certification	Date of Last EPA Approval
9-San Juan	Archuleta	1979	9/84	12/10/87	12/24/84
	Dolores La Plata Montezuma San Juan		update currently in progress		
10	Delta Gunnison Hinsdale Montrose Ouray San Miguel	1980	1/85 update currently in progress	6/14/85	1/9/86
11-Colorado West COG (Associate Governments of Northwest Colorado)	Garfield Mesa Moffat Rio Blanco	1979	10/86	12/86	6/16/87
12-Northwest Colorado COG	Eagle Grand Jackson Pitkin Routt Summit	1980	2/87	12/10/87	Never approved by EPA

Opportunities for salinity control were identified in the management plans for all areas of the Colorado River basin within Colorado. Critical salt yielding areas were assessed by the USDA, Colorado Soil Conservation Board, and local soil conservation districts. All updated 208 plans continue to contain lists of the NPDES permits within each area and stream classifications.

Region 9 covers primarily the San Juan Basin portion of Colorado. Salinity projects in this area include McElmo Creek and Mancos Valley.

The Region 10 plan covers primarily the Gunnison and Dolores River Basins. Salinity projects in this region include the Lower Gunnison, Paradox Valley and Sinbad Valley units.

Region 11 includes the Colorado main stem below Dotsero, and the lower reaches of the White and Yampa Rivers. The salinity control projects in this region are Grand Valley, Badger Wash, Glenwood-Dotsero and Meeker Dome.

The NCCOG (Region 12) is comprised primarily of the high mountain headwaters of the Colorado River and produces little salt loading to the river system. The NCCOG Water Quality Management Plan region directs salinity control efforts towards control of point sources and local control of non-point sources in the form of urban runoff restrictions. The updated Water Quality Management Plan for this region has been certified by the state and submitted to EPA for approval.

Colorado is endeavoring to fully implement the Section 208 plans as funding allows. To aid in this effort, when possible Colorado will utilize Section 319 funding available to it under the recent amendments to the Clean Water Act.

Nonpoint Source Program

Pursuant to Section 319 of the amended (1987) Clean Water Act, Colorado developed a "Nonpoint Source Assessment Report" which identified stream segments impacted by nonpoint source (NPS) pollution and categories of nonpoint source pollutants which added significant pollution to those stream segments. The report also recognized the impacts caused by salinity from nonpoint sources on several stream segments and principally attributed the elevated salinity levels in those segments to agricultural activities (i.e. irrigation and soil erosion due to grazing). It further recognized the significance of the salinity control efforts which have been made pursuant to the Colorado River Basin Salinity Control Act of 1974. The assessment report also recognized the need for development of best management practices (BMPs), to control nonpoint source pollution and a handbook of BMPs was completed in May 1989.

The "Colorado Nonpoint Source Management Program" was completed by the State and approved by EPA in May 1989. The program is intended to provide an implementation strategy for the future treatment of water quality problems identified in the Assessment Report. The program sets forth the roles and responsibilities of the various subcommittees; which include representatives from local, state, federal, and private organizations, that are responsible for implementing the nonpoint source program in Colorado. The program includes:

1. A description of each committee's membership and tasks it undertakes;
2. A priority system for reviewing, ranking and recommending NPS control projects, to establish their eligibility to receive state and federal monies set aside for such projects; and
3. A description of the management program and BMP's utilized by each subcommittee (agriculture and silviculture, urban and construction runoff, mining impacts, and hydrologic modifications).

Several nonpoint source control projects, for both statewide management and individual NPS control, which will reduce salinity in the Colorado River basin have been approved by the subcommittees for implementation. Other projects are contemplated and will be implemented as project plans are developed and funding becomes available. The first annual report on Section 319 activities was prepared in September 1989.

Other Activities

Colorado has continued its support of the basinwide approach to salinity control through its participation in the Colorado River Basin Salinity Control Forum and associated activities. This has included significant efforts on proposed Forum amendments to the Colorado River Basin Salinity Control Act and the Clean Water Act and coordination with local entities having an interest in the legislation.

The State of Colorado has also put significant work into the Grand Valley Salinity Control Unit coordination efforts since installation of facilities began in 1979. The Colorado Water Conservation Board, under a grant from Reclamation, assumed responsibility in 1985 for working with the irrigation water supply entities in the Grand Valley to organize the private individual laterals in the area into legal entities with whom Reclamation could contract for the O&M of the laterals after they are lined or placed in pipe. That effort has now proceeded to the point that Reclamation will begin working directly with the several entities which are considering assuming the ownership of the private laterals which are to be improved.

The Colorado Soil Conservation Board, with support from other state agencies, is continuing its work with the SCS, ASCS, and local soil conservation districts to direct, as appropriate, available federal soil conservation funding programs towards improvement of onfarm irrigation practice. The salinity control benefits of improved practices are one of the reasons for this effort.

A proposal for a federal-private desalinization project at Glenwood Springs has been submitted by a private contractor. The proposal calls for a cogeneration project with a gas fired generating unit producing 25 MW of power with the waste heat being used for desalting saline water from the Glenwood Springs. Legislation authorizing and funding the unit has been drafted and will be introduced by Colorado in the U.S. Congress.

Nevada

NPDES Permits

EPA has delegated the Nevada Division of Environmental Protection authority to issue NPDES Permits. Basic Management Industries has eliminated industrial wastewater discharges to Las Vegas Wash. The industries now pipe waste water to lined ponds where it evaporates. Two of the companies have been issued permits which allow discharge of cooling water to Las Vegas Wash with a limit of no more than 75 mg/l TDS increase over the water supply. Another Basic Management Company has been issued a permit which allows discharge of surface storm runoff.

In the past, the Nevada Power Company (Company) discharged brackish cooling water from both the Clark and Sunrise Power Plants into Las Vegas Wash. Permits now prohibit such discharges and the Company treats and recycles water for further cooling before final disposition in lined evaporation ponds. The new recycling process has reduced cooling water requirements by about 75 percent.

The City of Las Vegas and the Clark County Sanitation District (CCSD) Secondary Treatment Plants and the CCSD Advanced Wastewater Treatment (AWT) Plant are the only municipal dischargers of surface effluent into Las Vegas Wash.

The City of Henderson, acting independently of the other municipalities contributing effluent to the Las Vegas Wash, has changed its secondary plant discharges to rapid infiltration basins and subsequent reuse and has been issued a ground-water discharge permit. This will enable Henderson to discharge excess treated effluent from their aeration treatment plant in an acceptable manner. Some of the infiltrated effluent seeps into Las Vegas Wash and some is captured and reused on several local projects, including parks, cemeteries, a golf course and a green belt along the Boulder Highway.

The Clark County Sanitation District (CCSD) plans to make direct discharge of part of Laughlin's wastewater effluent into the Colorado River and to make reuse of the remainder on local golf courses. The CCSD estimates that by the year 2000, 7,000 af/y of treated effluent in Laughlin will ultimately be available, 2,000 af/y will be reused, and 5,000 af/y will be returned to the Colorado River for credit. An NPDES permit has been issued. The quality of the waters affected by this permit will be closely monitored and all necessary programs to protect water quality standards will be implemented.

Nevada is continuing to apply the policies adopted by the Forum.

Water Quality Management Planning

A Section 208 Plan for Clark County was completed by the Clark County Department of Comprehensive Planning in February 1980. It was approved by EPA in October, 1981. The Clark County Commissioners approved an alternative to the plan in August 1985 which involved construction of primary treatment facilities to handle part of the sewage from the City of Las Vegas, North Las Vegas and that from the County service area. The sewage would then be delivered for further treatment to the Advanced Wastewater Treatment Plant. An amendment to the 208 Plan is in process which will update Las Vegas valley water quality management practices with respect to wastewater treatment, effluent reuse, water conservation, flood control, stormwater permitting, and the Las Vegas Wash. It also evaluates the primary and secondary environmental impacts resulting from the updated strategies and discusses appropriate mitigation measures.

The economic and demographic changes that have taken place since 1985 have been dramatic. On March 19, 1990, EPA approved, without condition, the revision of the 208 Plan for Clark County, adopted by the Clark County Board of Commissioners on September 19, 1989 and certified by the State of Nevada on December 4, 1989. This amendment provides updated population projections and wastewater flow projections for the designated planning area in Clark County, Nevada, through the year 2010 which will be used for all future 208 related work. The 1989 amendments reflect the current needs and concerns for water quality in the rural areas of Clark County.

In addition, the Nevada Division of Environmental Protection (NDEP), within the past year, has issued revised water quality standards for Lake Mead, has proposed new effluent limitations for wastewater effluent discharged to the Las Vegas Wash, and has proposed new regulations governing effluent reuse. Also, EPA has issued new preliminary regulations on sludge disposal and stormwater discharge permitting. These new NDEP and EPA standards and regulations will have a significant impact on water quality management plans in the Las Vegas Valley.

The Clark County Sanitation District is in the process of preparing a 201 Facilities Plan that recommends enlarging the total treatment capacity from 50.5 million gallons per day (mgd) to 87.5 mgd that should meet capacity requirements until 2010. The AWT plant capacity is 90 mgd. The plant handles both City and County wastewater in storm situations as the City plant is unable to discharge because of high water level elevations in Las Vegas Wash next to the plant. The AWT plant will need to be expanded about 2004.

In December 1985, Clark County, and later the State Division of Environmental Protection, approved optional plans for the City of Las Vegas to enlarge its secondary treatment plant. Approval by EPA was given in May 1988 and construction will begin early in 1990, to enlarge the plant from 41 to 66 mgd.

Other Activities

A program has been developed by Clark County Sanitation District, Las Vegas, and North Las Vegas to coordinate, investigate, and encourage the implementation of management practices resulting in reduction of wastewater salinity. The principal emphasis of this program will be directed toward salinity control to meet the requirements of the NPDES permits issued to Clark County and the City of Las Vegas.

New Mexico

NPDES Permits

Authority for issuing permits has not been delegated to the State, and the program is being administered by EPA, Region VI. EPA is following the Forum policy in the administration of the permit program. In the Colorado River basin within the state, the following industrial permits have been issued: electric power - 3; coal mines - 8; uranium mines - 3; and gravel plants - 4. Two of the eight coal mines are currently in operation, while no uranium mines are operating. All new or renewed discharge permits contain language requiring the permittee to adhere to Forum policy regarding salt discharge.

Municipal discharge permits have been issued for three (3) major and three (3) minor sewage treatment plants, four (4) small domestic sewage systems, one (1) water treatment plant, ten (10) Federal/Indian wastewater facilities, and two (2) underground storage tank cleanup programs. Forum policy is followed in the issuance of new or reissued permits.

Water Quality Management Planning

Major elements of the State of New Mexico Water Quality Management Plan that have applicability to the Colorado River basin are sediment control, silviculture, and irrigated agriculture. The New Mexico Water Quality Control Commission is responsible for plan adoption in New Mexico. The initial plan was adopted in two parts in October 1978 and May 1979. The plan has been updated eight times since, most recently in 1989. The importance of working cooperatively with the Forum is recognized in the plan.

The plan covers the entire state except for that portion of the Navajo Reservation lying within the state. Planning within the Reservation is the responsibility of the Navajo Tribe. Much of the Colorado River basin in New Mexico is within the Reservation.

The State of New Mexico Water Quality Management Plan encourages the voluntary use of best management practices (BMP's) to control or reduce non-point sources of pollution. The plan designates the San Juan River Basin in New Mexico as one of the four priority basins for implementation of BMP's for sediment control.

The 1984 update to the plan included designated management agencies responsible for implementation of the non-point source control programs set forth in the plan. The agencies designated for those portions of New Mexico lying within the Colorado River basin are:

New Mexico Forestry Division for silviculture;

New Mexico State Highway Department, New Mexico State Park and Recreation Division, and Jicarilla Apache Tribe for rural road construction and maintenance;

New Mexico State Land Office and U.S. Bureau of Land Management for sediment control;

U.S. Forest Service for sediment control, rural road construction and maintenance, and silviculture, and;

U.S. Bureau of Indian Affairs for sediment control, rural road construction and maintenance, silviculture, and irrigated agriculture.

Another management strategy used to control nonpoint source pollution was developed by the State under Section 319 of the 1987 Amendment to the Federal Clean Water Act. This section required each state to develop an assessment of its nonpoint source impacted waters and a management plan for controlling pollution from nonpoint sources. Both the assessment and the management program have been approved by EPA. The goal of the management plan is to develop and implement a program which will reduce man-induced

pollutants from nonpoint sources entering surface and ground waters. Several management agencies including the U.S. Forest Service, BLM, and the Bureau of Indian Affairs participated in the development of the Nonpoint Source Management Program.

Other Activities

The State of New Mexico through the Forum, Advisory Council, and the New Mexico Water Quality Control Commission supports the Colorado River Basin Salinity Control Program and is taking all reasonable actions to insure its implementation. State actions include: (1) support of federal legislation including appropriations to implement the program, (2) inclusion of salinity control measures in the Section 208 plans, (3) dissemination of information on salinity sources and control measures to the water users and the public in the Colorado River basin area of the state, (4) consultation with industries on potential salinity reduction measures, (5) implementation of Forum policy through existing legal and institutional mechanisms, e.g. NPDES Permits, (6) providing funding for the Forum's executive director whose major function is to assist in carrying out the Colorado River salinity program, (7) allocation of state financial and manpower resources to several salinity research efforts, (8) providing matching funds to support the USGS water quality data collection program in the Colorado River basin portion of the state which is necessary to monitor salinity conditions on the river, and (9) maintaining a continuous water quality planning program whereby new or additional salinity control measures can be addressed. The availability of state funds used in support of items (7) and (8) above, has caused a reduction in those programs since 1986.

Utah

NPDES Permits

The Utah Bureau of Water Pollution Control administers the discharge permit program. The State has the responsibility for issuance and compliance for all new permits and permit renewal applications received since July 7, 1987.

A total of 63 discharge permits are in effect for industrial facilities in the Utah portion of the Colorado River basin. Most of the permits are for facilities with no discharge or discharge of intercepted ground water from mining operations in accordance with Forum policy. Rio Algom which was a major discharger ceased discharging in November 1988.

There are 28 municipal treatment facilities in the Colorado River basin of Utah. Currently, 12 wastewater treatment facilities provide total containment.

Water Quality Management Planning

The Five County Water Quality Management Plan update was reviewed and certified by the State and approved by EPA. Water quality management plans for the Uinta Basin, Southeastern Utah, and Wayne County were certified by the State and conditionally approved by EPA in a previous year.

Other Activities

Utah's Nonpoint Source (NPS) Management Plan was approved by EPA in December 1989. The plan contains Utah's strategy for the control of NPS pollution in the state. A major element in the plan is the need to define rangeland areas in the Colorado River drainage which are yielding sediment and salinity to the system. A joint project between the State Departments of Agriculture, Health and Division of Water Resources joined with Reclamation, BLM, SCS, and Geological Survey will begin the task of delineating these areas on April 1, 1990. The project is scheduled for completion in April 1991. This project is expected to produce several watershed projects which may be implemented for salinity control on a cost-effective basis.

Utah also operates a low interest loan program which provides funding for soil and water conservation and water quality improvement practices for farms. Utah has committed a substantial amount of funding through this program to irrigation improvement projects which provide salinity reduction from onfarm sources. This program operates under the guidance of the Soil Conservation Commission and local soil conservation districts.

The Uinta Basin Soil Conservation District is actively involved in developing salinity controls for farms. The District conducts an irrigation water management program which provides information to farmers about irrigation timing and quantity to reduce deep percolation and water loss. The District consults on grants through the Agricultural Conservation Program of the ASCS and they provide education and information about salinity control efforts.

Wyoming

NPDES Permits

The Wyoming Department of Environmental Quality, Water Quality Division, administers the NPDES Program. The Forum "Policy for Implementation of Colorado River Salinity Standards Through the NPDES Permit Program" is utilized to evaluate industrial and municipal dischargers. There is only one significant industrial source of salinity in the Green River Basin. The Utah Power & Light Company Naughton Plant discharges approximately 20 tons of salt per day to a tributary of the Green River. This permit was

issued on the basis that it was not "practicable" to implement the Forum policy of no discharge of salt from industrial sources. This decision was based upon a comparison of the costs of removing salt and downstream benefits associated with eliminating the discharge. The current permit expires October 31, 1992, and will be reevaluated for consistency with Forum policy at that time.

A total of 52 NPDES permits are currently active in the Wyoming portion of the Colorado River basin. Except for the previously discussed permit, all of these discharges are very small. Fourteen municipal discharge permits serving a total population of 41,000 have been issued. Of this total, 32,000 are in Rock Springs and Green River. The incremental increase in total dissolved solids concentration is 420 mg/l and 400 mg/l, respectively, for Rock Springs and Green River. Of the 12 other municipal discharges, most are in compliance; however, a few exceed the 400 mg/l incremental increase in salinity by a few milligrams per liter. It is not economically feasible to implement a comprehensive municipal salinity control program for these very small salt loads. There are 13 other domestic discharges in the basin. These are all small facilities that do not exceed the 400 mg/l incremental increase. Twenty-five other industrial dischargers also operate in the basin, all are in compliance with Forum policy.

Water Quality Management Planning

The Water Quality Management Planning and Nonpoint Source Implementation Programs in Wyoming are under the direction of the Water Quality Division of the Department of Environmental Quality. The Clean Water Report for Southwestern Wyoming addressed water quality in Lincoln, Uinta, and Sweetwater Counties. This report was adopted at the local level, certified by the Governor, and conditionally approved by the EPA on October 9, 1980. The Governor's certification recognized a salinity control program for the Green River Basin as a major water quality priority. The state strongly supports the current USDA efforts in the Big Sandy River Unit.

The Statewide Water Quality Management Plan establishes an institutional framework under which planning and implementation activities can proceed in Wyoming. Implementation of much of the program depends on the availability of funds and the acceptance of responsibilities by the designated management agencies.

The Wyoming Nonpoint Source Management Plan was partially approved by EPA in September 1989. The Plan calls for a cooperative, voluntary approach in the implementation of BMP's targeted at water quality improvements. As with the Statewide Water Quality Management Plan, implementation hinges upon acceptance of responsibilities by designated management agencies and upon the availability of funding under Section 319.

Education and Public Involvement

The Colorado River basin salinity control problem is basinwide, with implications which range over the entire 244,000 square mile basin drainage area. The basin's immense size highlights the need for effective public education and public involvement programs due to the physical and cultural diversities which exist across the seven states. Implementation of measures to control complex problems such as salinity, requires awareness, concern and involvement, along with recognition that a problem many miles away may have direct impacts/implications. The states individually and in concert as the Forum have and will continue to work with concerned agencies, both State and Federal, to increase the public understanding of the salinity problem and its control. The Forum's annual progress reports are one component of this educational effort and are distributed to all interested individuals and organizations.

Since irrigation is the principal human-induced source of salinity, a major thrust of the public education/public involvement effort focuses on educating irrigators as to the sources, impacts, and methods of controlling salinity, specifically the means to improve irrigation practices so as to reduce the input of salts into the river system. The goal of this effort is to encourage desirable changes in water application technology and management practices. The Basin states work within the framework of ongoing efforts (Water Quality Management Programs, SCS, and Cooperative Extension Service) to achieve this goal, and assistance from the Executive Director of the Forum is routinely provided. The plan formulation phase of Reclamation, USDA, and BLM salinity control projects provides an excellent opportunity for public education with regard to Colorado River salinity and the means for its control.

Meetings of the Colorado River Basin Salinity Control Forum are open and the public is welcome to attend. All input, whether orally or in writing, is considered and acted on as appropriate by Forum consensus. The Forum also provides for public involvement in the water quality standards review process in that public meetings are held to receive comments on the salinity standards during each triennial review. As a result of such public input, appropriate changes are made.

As each of the Basin states proceeds with its adoption process, one or more statewide, public hearings are held. In addition, there is widespread announcement of the Forum and state hearings, and copies of the Forum Review and associated state standards are mailed to interested agencies, groups, and individuals.

The Forum members participate with their water quality planning agencies in matters related to salinity and salinity control and will continue to do so as the need arises.

In cooperation with the USDA, the Forum, and other entities, Reclamation publishes a quarterly newsletter entitled Salinity Update. This newsletter provides current information on Reclamation, USDA, Forum, and other activities related to salinity control. In addition, the Forum and the states utilize the newsletter as a means of keeping the public advised of their activities. The newsletter is mailed to over 900 readers and is provided free of cost to any interested person or party.

Forum Activities

The Forum meets about twice a year, or as needed, to discuss the salinity control program, the efforts of the federal agencies and the states, and the need for additional policy and/or action by the Forum. During the last triennial review effort, the Forum met on May 28, 1987, in Cheyenne, Wyoming, and adopted the preliminary report for 1987. The Forum then held public meetings during the summer, and after receiving comments, prepared a supplemental report dated August 1987.

During this reporting period, the Forum also met on May 28, 1988, in Santa Fe, New Mexico; October 27-28, 1988, in San Diego, California; May 31, 1989, in El Paso, Texas; October 17-18 in San Francisco, California; and December 6, 1989, in Las Vegas, Nevada. In all, since the creation of the Forum in November of 1973, the Forum has held 42 meetings. Several years ago the Forum published a compilation of all of the minutes of the Forum meetings from 1973 through 1985. The Forum held its 42nd meeting on May 22, 1990, in Albuquerque, New Mexico, and approved this report for publication.

In addition, the Forum has created a Work Group which holds meetings on a more frequent basis to review technical information which is being generated by the federal agencies. Membership on the Work Group is composed of technical representatives from each of the seven Basin states. Federal agency representatives, however, attend meetings of the Work Group and informally exchange information, ideas, and viewpoints. The Work Group coordinates the efforts of the seven Basin states and reports back to the Forum any actions which the Work Group feels the Forum should consider.

Following the 1987 Review, the Forum adopted a new NPDES permits policy concerning fish hatcheries (see Appendix A). In addition, the Forum also has taken a position on many ongoing issues, such as the need for the appropriation of funds by the Congress (see page I-7). Federal agencies have also prepared numerous reports in the three-year period. The Forum has compiled a computer library of many reports relating to Colorado River salinity. The Work Group and the Forum have had opportunity to review and comment on these reports in draft form. Most notable was the combined federal agency report entitled 1988 Joint Evaluation of Salinity Control Programs and also the 1989 Joint Evaluation of Salinity Control Programs in the Colorado River

Basin. These two reports evaluate progress and set forth the salinity control efforts needed to meet the numeric criteria.

In addition, the Forum and the Work Group have, over the last three years, assisted the Advisory Council in the preparation of three annual reports. The Forum also prepared and issued two annual reports: (1) the 1988 Annual Progress Report, Water Quality Standards for Salinity, Colorado River System, January 1989, and (2) the 1989 Annual Progress Report, Water Quality Standards for Salinity, Colorado River System, March 1990. This triennial review, the Report on the 1990 Review, Water Quality Standards for Salinity, Colorado River System) will also serve as the annual report for 1990.

The Forum previously established policies with respect to the issuance of NPDES permits within the basin. Permits are issued by the individual states, or in the case where authority has not been delegated to the states, by EPA. The Forum prepares a comprehensive list of NPDES permits in the basin. That listing is updated each year. The latest updated list has been included as a part of this report as Appendix C. The listing indicates the name of the permit holder, the type of discharge, the river reach in which the discharge is located, and the amount of salt which is being discharged through the permit.

CHAPTER VI - MEANS OF MAKING PLAN OPERATIONAL

Legislation Needed to Carry Out Programs

The modifications to Public Law 93-320 in 1984 by P.L. 98-569 established most of the components necessary to effect the plan of implementation as it is now set forth. The Department of Agriculture's (USDA) program was authorized in 1984. This program provides for USDA to investigate additional salinity control areas. Upon completion of reports which find salinity control in new areas to be cost effective and environmentally acceptable, and after advising the Congress of its findings, the USDA can initiate efforts in these newly investigated areas.

The work anticipated by BLM in the current plan of implementation is already authorized under existing authorities. BLM officials are authorizing studies which may identify an expanded role for the BLM. With time, it may be necessary to seek legislative authority for specific BLM activities.

Reclamation was authorized to construct four units when the Salinity Control Act was initially enacted in 1974. In 1984, one of those units (Crystal Geyser) was deauthorized, and the Lower Gunnison Unit was authorized.

The current plan of implementation includes work by Reclamation in the Uinta Basin of Utah and the Hammond area of New Mexico. It further contemplates entering into a contract with private industry for the desalinization of waters at Glenwood Springs, Colorado. Those three efforts will require Congressional authorization. In addition, Reclamation will need legislative authority to proceed with its portion of the Price-San Rafael unit as it is now envisioned. USDA's portion is dependent upon the construction of Reclamation's portion of that unit.

The Basin states intend to seek legislative authority from the Congress as needed. They further intend to urge the Administration to request Congress to provide the necessary project authority so that the entire plan of implementation can move ahead as agreed upon by the federal agencies and the Basin states.

Financing Salinity Control Activities

In enacting Public Law 93-320, Congress recognized the federal responsibility for the Colorado River as an interstate stream and adopted a cost-sharing formula which provides that 75 percent of the costs of the four Department of the Interior salinity control projects authorized by Title II of the Act are nonreimbursable. The remaining 25 percent of the costs are to be repaid from the Upper and Lower Basin Funds over a 50-year period without interest. The maximum allocation to the Upper Basin is not to exceed 15 percent of the total costs to be repaid from the two funds with the remainder to be repaid by the Lower Basin Fund.

The 1984 amendments to P.L. 93-320 changed the cost-sharing formula. For the Department of the Interior program, the non-reimbursable portion was reduced to 70 percent with the remaining 30 percent to come from Upper and Lower Basin Funds in the same proportionate share as under P.L. 93-320. However, the Upper Basin Fund would repay its share over 50 years with interest and the Lower Basin Fund would reimburse its share of the annual expenditure during the year that costs are incurred.

The voluntary onfarm salinity control program of USDA requires a minimum 30 percent cost-share from the local participants unless the Secretary of Agriculture finds that such cost-sharing requirements would result in a failure to proceed with the needed onfarm measures. In addition, the Federal Government would receive a 30 percent reimbursement from the Basin Funds in the manner in which reimbursements are made for Interior programs. Thus the local participants' contribution plus the reimbursement from the Basin Funds, insure that the nonfederal contributions to the USDA salinity control program will always exceed 50 percent of the total construction costs.

Public Law 98-569 also provided that costs of operation and maintenance of Reclamation's salinity control units will be the responsibility of the project owners, but are limited to the costs that would have been incurred absent the project works. Costs of operation and maintenance in excess of that amount, costs of salinity control unit replacements, and costs of operation and maintenance of works to replace impacted fish and wildlife values will be a federal cost.

Costs of operation and maintenance of USDA salinity control units including those for voluntary replacement of fish and wildlife values foregone are the responsibility of the program participants.

Revenues in the Lower Basin Fund for the salinity control program are derived from a 2-1/2 mill levy on hydropower generation in the Lower Basin. The plan of implementation presented in this Review incorporates a construction schedule that, when implemented, would have an estimated cost of \$641 million. Under this plan, the required salinity reduction can be made throughout the planning period (2010), and the Lower Basin Fund will be adequate to meet its obligation of repayment if the annual inflation rate does not exceed three percent.

Two potential sources of funding to assist salinity control efforts exist under the Clean Water Act. Fiscal Year 1990 is the first year of Congressional appropriations for Section 319 NPS control funds (nearly \$40 million). Section 319 funds are available for implementing state-adopted EPA-approved NPS management programs. The states also have the opportunity to designate up to 20 percent of their wastewater treatment construction grant funds under Section 201(g)(1)(B) for implementing their NPS management programs.

Responsibility for Accomplishing Salinity Control Measures

The plan of implementation recognizes that the Forum, the several federal agencies, and the Basin states each have specific responsibilities for furthering the salinity control program. Table 8 presents, in summary form, the elements of the plan of implementation, which considers full implementation of all salinity control measures discussed in Chapters IV and V. The table includes actions to be taken, the time schedule, and the responsible entities.

The Forum will provide overall coordination and a continuing review of salinity changes and program effectiveness. Every three years, or more often if necessary, the Forum, in light of existing depletions and salt concentrations, will consider and, when needed and feasible, recommend revisions in the schedule for implementing salinity control measures and/or modifications of the numeric criteria. The review will include both federal and non-federal programs.

Appropriate federal agencies will complete planning reports and seek authorization and funding for salinity control in accordance with Title II of Public Law 93-320 and P.L. 98-569. The Basin states will lend their support to requests for authorization and funding.

Identifying and Evaluating Progress in the Salinity Control Program

Progress in the salinity control program is monitored and evaluated on a continuing basis. Changes in the plan of implementation are considered at the conclusion of each 3-year review, or more often as appropriate. Annually, the states, acting through the Forum, will prepare a report summarizing pertinent results and progress of the salinity control program and the effect of other actions having influence on salinity. This Review is transmitted to the EPA and to state water resources and pollution control agencies, and will be made available to others interested in the salinity control program.

Standards Review Procedures

Prior to state action on the review of the numeric criteria and plan of implementation, public review and discussion will be sought through public meetings. The Forum will hold two regional meetings in the basin to describe the basinwide nature of the salinity problem and the control program and to solicit views from interested agencies, groups, and individuals.

In accordance with provisions of the Clean Water Act, each of the Basin states will consider the Forum's Review. There has been no change in the numeric criteria since adoption in 1975 by the

Table 8
Timing and Responsibility for Accomplishing the Implementation Plan

Activity or Source of Salinity ^{1/}	Major Actions	Timing ^{2/}	Entities Responsible for taking action
Meeker Dome Unit (page 28)	Completed plugging of 4 abandoned oil wells. Planning Report concluding the study published. Unit completed.	1983 1985	USBR
Grand Valley Unit (page 30) Water Systems Improvements	Initial year of salt removal (Stage I). Unit completed. Improve canals, laterals (Stage II).	1984 1985-2000	USBR USBR, State of Colorado
Onfarm Improvements	Balance of Stage II Implement onfarm irrigation and related lateral improvements with CRSC funds. Initial year of salt removal.	Under consideration 1979-2010 1980	USBR, State of Colorado USDA, local participants
Abandoned Well Plugging (page 42)	Several abandoned oil wells plugged in Wyoming and Colorado.	1975-1980	BLM
Paradox Valley Unit (page 30)	Drill injection well, install surface facilities, and conduct test program. Initial year of salt removal	1987-1994 1994	USBR
Glenwood Springs Unit (page 37)	Construct co-generation/desalting facility Initial year of salt removal	1990 1991	Private industry, USBR

Table 8
Timing and Responsibility for Accomplishing the Implementation Plan (cont.)

Activity or Source of Salinity ^{1/}	Major Actions	Timing ^{2/}	Entities Responsible for taking action
Las Vegas Wash Unit (page 32) Pittman Area	Completed construction of Bypass Pipeline	1985	USBR
	Initial year of salt removal.	1985	
Big Sandy River Unit (page 34) Point Source Control	Initial Planning Report concluding study.	1989	USBR
Onfarm Improvements	Complete Planning Reports and EIS.	1987	USDA
	Implement onfarm irrigation and related lateral improvements with CRSC funds.	1988-2006	USDA, local participants
	Initial year of salt removal.	1989	
McElmo Creek/Dolores Unit (page 35) Water System Improvement	Combine features of canals and lateral lining with Dolores Project.	1989-1995	USBR, State of Colorado
	Initial year of salt removal.	1991	USBR
Onfarm Improvements	Implement onfarm irrigation and related lateral improvements with CRSC funds.	1990-2007	USDA, local participants
	Initial year of salt removal.	1991	

Table 8
Timing and Responsibility for Accomplishing the Implementation Plan (cont.)

Activity or Source of Salinity ^{1/}	Major Actions	Timing ^{2/}	Entities Responsible for taking action
Lower Gunnison Basin Unit (page 33)			
Water Systems Improvement (Uncompahgre Area) Stage 1	Construct winter water portion.	1990-1995	USBR, State of Colorado
	Initial year of salt removal.	1991	USBR, State of Colorado
Balance of Lower Gunnison Basin (North Fork Area)	Complete Planning Report.	1990	USBR, State of Colorado
Water Systems Improvement (Stage 1 Balance)	Selective lining.	Under consideration	USBR, State of Colorado
Onfarm Improvements (Lower Gunnison 1)	Implement onfarm and related lateral improvements with CRSC funds.	1988-2010	USDA, local participants
(Lower Gunnison 2 - Montrose)	" " "	1991-2010	USDA, local participants
(Lower Gunnison 2 - Delta)	" " "	1991-2010	USDA, local participants
(Lower Gunnison 3)	" " "	1992-2006	USDA, local participants
Hoapa Valley (page 36)			
Onfarm Improvements	Initiate onfarm irrigation and related lateral improvements.	1991-2002	USDA, local participants
	Initial year of salt removal.	1992	

Table 8
Timing and Responsibility for Accomplishing the Implementation Plan (cont.)

Activity or Source of Salinity ^{1/}	Major Actions	Timing ^{2/}	Entities Responsible for taking action
Uinta Basin Unit 1 (page 32) Water Systems Improvements	Construct lining of canals and laterals.	1993-2000	USBR, State of Utah
	Initial year of salt removal.	1994	
Onfarm Improvements	Implement onfarm and related lateral improvements with CRSC funds.	1980-2010	USDA, local participants
	Initial year of salt removal.	1981	
Price-San Rafael Rivers Unit (page 38) Water Systems Improvements	Draft Coordinated Plan.	1991	USBR/USDA
	Initiate delivery system improvements.	1994-2004	USBR
Onfarm Improvements	Onfarm irrigation and related lateral improvements (coordinated program).	1994-2010	USDA, State of Utah, local participants
Lower Virgin River Unit (page 38)	Complete plan formulation working document.	1989	USBR
	Proposed use of saline water for cooling the proposed Harry Allen Power Plant.	Under consideration	USBR, State of Nevada

Table 8
Timing and Responsibility for Accomplishing the Implementation Plan (cont.)

Activity or Source of Salinity ^{1/}	Major Actions	Timing ^{2/}	Entities Responsible for taking action
Sinbad Valley Unit (page 39) Point Source Control	Completed Planning Report.	1983	BLM
	Study responsibility shifted to USBR.	1984	
	Additional studies to select and evaluate control plan.	Under consideration	USBR
Mancos Valley (page 39) Onfarm Improvements	Initiate onfarm irrigation and related lateral improvements.	Under consideration	USDA, local participants
Virgin Valley (page 39) Onfarm Improvements	Initiate onfarm irrigation and related lateral improvements.	Under consideration	USDA, local participants
San Juan River Unit (page 37)	Completed advance draft planning report.	1991	USBR
Hammond (USBR)	Canal and lateral improvements.	1994-1996	USBR, local participants
Hammond (USDA)	Complete plan/EIS.	1991	USDA, local participants
	Initiate onfarm activities.	1994-2007	USDA, local participants
	Initial year of salt removal.	1995	

Table 8
Timing and Responsibility for Accomplishing the Implementation Plan (cont.)

Activity or Source of Salinity ^{1/}	Major Actions	Timing ^{2/}	Entities Responsible for taking action
Water Quality Management Plans	Develop Water Quality (208) Management Plans.		Certification by the state and approval by EPA.
<u>Arizona</u> (page 50) Western Arizona COG	Implementation	Ongoing	Western Arizona COG, local agencies, state, EPA.
	Develop nonpoint source controls.	1988	District IV COG, local agencies.
Northern Arizona COG	Implementation	Ongoing	Northern Arizona COG, state, local agencies, EPA.
Statewide Plan	Implementation	Ongoing	State, local agencies, EPA.
<u>California</u> (page 51) East and West Colorado River Basin	Plan Update EPA approval	1985 1985	California Regional Water Quality Control Board, state, local agencies, EPA.
<u>Colorado</u> (page 52) Northwest Colorado COG	Plan Update State Certification EPA approval	1986 1979	NW. Colorado COG, state, local agencies, EPA.
Region 10	Plan Update State Certification EPA approval	In progress 1985 1986	Region 10 COG, state, local agencies. USBR, USDA, EPA.
State Plan Region 9 (San Juan)	Plan Update State Certification EPA approval	In progress 1984 1984	USBR, USDA, state, local agencies, local farmers, EPA.
State Plan Region 11 (Colorado West)	Plan Update State Certification EPA approval	1986 1980 1981	USBR, USDA, state, local agencies, local farmers, EPA.

Table 8
Timing and Responsibility for Accomplishing the Implementation Plan (cont.)

Activity or Source of Salinity ^{1/}	Major Actions	Timing ^{2/}	Entities Responsible for taking action
Water Quality Management Plans (continued)			
<u>Nevada</u> (page 56)			
Clark County (includes entire drainage area of Colorado River in Nevada)	Conditional state certification. Conditional EPA approval. Revised 208 Plan completed. State certification. EPA approval. Wastewater reuse and disposal of industrial use. Develop salinity source control strategy for wastewater.	June 1978 July 1979 February 1980 May 1980 October 1981	Clark County Commission, state, local agencies, EPA.
Statewide	State Certification. Conditional EPA approval. Revised 208 Plan (draft). State certification. EPA approval. Nevada diffuse source regulations adopted by State Environmental Commission.	November 1978 March 1979 June 1981 September 1981 October 1981 October 1980	Nevada Department of Natural Resources, state, EPA.
<u>New Mexico</u> (page 58)			
Statewide	Plan Update. State certification. EPA approval. Implement BMP's Develop information and education programs. Reduce nonpoint source salinity from silviculture, sediment irrigated agriculture, and road construction and maintenance.	1985	State, local agencies, EPA. State and Federal agencies, Indian Tribes, and NM Soil and water conservation districts.

Table 8
Timing and Responsibility for Accomplishing the Implementation Plan (cont.)

Activity or Source of Salinity ^{1/}	Major Actions	Timing ^{2/}	Entities Responsible for taking action
Water Quality Management Plans (continued)			
<u>Utah</u> (page 60) Southwestern	State Certification EPA Approval Implement Plan	December 1979 May 1980 Ongoing	Southwestern Utah AOG, state, local agencies, EPA.
Uintah Basin	State Certification EPA Approval Implement Plan	November 1978 September 1979 Ongoing	Uintah Basin AOG, state, local agencies, EPA. State USDA, Soil Conservation District, local agencies.
Southeastern	State Certification EPA Approval Implement Plan	April 1980 May 1980 Ongoing	Southeast Utah, AOG, USDA, USBR, BLM, state, local agencies.
Six County Area	State Certification EPA Approval Implement Plan	January 1981 April 1981 Ongoing	Six County AOG, state, USGS, USDA, local agencies.
Ute Indian Tribe	Develop Plan	-	Ute Indian Tribe.
<u>Wyoming</u> (page 61) Southwestern	State Certification. EPA approval. Improvement of irrigation management practices, promote use of saline waters for industrial purposes, point source salinity control.	March 1980 October 1980 Further action pending completion of USBR and USDA studies.	Southwestern Wyoming, Water Quality Asso., state, EPA. WYO WQA, USDA, USBR, state, local agencies, local farmers.
Statewide	State Certification. EPA approval. Improved irrigation management practices. Use of saline water for industrial purposes.	March 1980 July 1980	Wyoming Department of Environmental Quality, state, local agencies, EPA.

Table 8
Timing and Responsibility for Accomplishing the Implementation Plan (cont.)

Activity or Source of Salinity ^{1/}	Major Actions	Timing ^{2/}	Entities Responsible for taking action
Other Activities			
Industrial Water Use (Appendix A)	Encourage and promote the use of saline or brackish water for industrial purposes except where it would be environmentally unsound, economically infeasible, or significantly increase consumptive use.	1980 through 2010	Affected state, USBR, and EPA.
Industrial Discharge (Appendix A)	The objective for industrial discharges shall be a no-salt return policy wherever practicable. EPA has endorsed the policy statement of the Forum and each state that has permit issuing authority has adopted the policy. All states are following the Forum policy regarding NPDES permits.	Ongoing	Each state, EPA.
Agricultural Discharges	Conduct educational program.	1980 through 2010	Affected state.
Baseline Values (page 13)	Review and revise, if necessary, baseline salinity values for the specified monitoring points.	1990	Forum.
Annual Reports	Prepare annual report on salinity control program effect of other activities having an influence on salinity.	Annually	Forum.
NPDES Permits (Appendix C)	Review effluent limitations on salinity through the NPDES permit program.	Ongoing	Basin states having permit-issuing authority. Otherwise EPA.
Standards Review (page 79)	Reconsider and, when necessary, revise schedule for installing salinity control measures and/or modify the numeric criteria.	1993 or before, at least each 3 years thereafter	Seven states.

1/ Page reference to discussion in report.

2/ Some ongoing programs will continue indefinitely; others will have dates assigned for either completion or significant action after they have progressed further.

Basin states and approval by EPA. The Basin states again find the numeric criteria to be appropriate. Action by each state will be accomplished according to the required procedures of each state and the Water Quality Standards Regulation (40 CFR Part 131).

CHAPTER VII - PROVISION FOR REVIEWING AND REVISING STANDARDS

The Forum, in its statement of "Principles and Assumptions for Development of Colorado River Salinity Standards and Implementation Plan," approved by the Forum on September 20, 1974, included Principle 7 as follows:

"7. The plan of implementation shall be reviewed and modified as appropriate from time to time, but at least once each 3 years. At the same time, the (numeric) standards, as required by Section 303(c) (1) of P.L. 92-500 shall be reviewed for the purpose of modifying and adopting standards consistent with the plan so that the Basin states may continue to develop their compact-apportioned waters while providing the best practicable water quality in the Colorado River basin."

The Forum took this position because the Colorado River basin is a large and complex area with many problems. A wide range of research, technical studies, and actions are underway and much knowledge is yet to be gained. Usable procedures for reducing the volume of saline irrigation return flows have been developed and the USDA is aggressively moving forward, within the funds available, with the voluntary cost-share program with individual farmers, irrigation districts, and canal companies to improve onfarm water management practices and local water delivery systems.

The permanent Work Group keeps current with salinity control efforts and suggests revisions. The Work Group operates under a schedule which enables the states to take action on any potential revision by the required revision date.

APPENDIX A

Forum Policies

POLICY
FOR IMPLEMENTATION OF
COLORADO RIVER SALINITY STANDARDS
THROUGH THE NPDES PERMIT PROGRAM

Adopted by
The Colorado River Basin Salinity Control Forum

February 28, 1977

In November 1976, the United States Environmental Protection Agency Regional Administrators notified each of the seven Colorado River Basin states of the approval of the water quality standards for salinity in the Colorado River System as contained in the document entitled Proposed Water Quality Standards for Salinity Including Numeric Criteria and Plan of Implementation which provides for a flow-weighted average annual numeric criteria for three stations in the lower main stem of the Colorado River: below Hoover Dam, below Parker Dam, and at Imperial Dam.

The Plan of Implementation is comprised of a number of federal and non-federal projects and measures to maintain the flow-weighted average annual salinity in the Lower Colorado River at or below numeric criteria at the three stations as the Upper and Lower Basin states continue to develop their compact-apportioned waters. One of the components of the Plan consists of the placing of effluent limitations, through the National Pollutant Discharge Elimination System (NPDES) permit program, on industrial and municipal discharges.

The purpose of this policy is to provide more detailed guidance in the application of salinity standards developed pursuant to Section 303, and through the NPDES permitting authority, in the regulation of municipal and industrial sources. (See Section 402 of the Federal Water Pollution Control Act.) This policy is applicable to discharges that would have an impact, either direct or indirect, on the lower main stem of the Colorado River System. The "lower main stem" is defined as that portion of the main river from Hoover Dam to Imperial Dam.

I. Industrial Sources

The Salinity Standards state that the objective for discharges shall be a "no-salt return" policy whenever practicable. This is the policy that shall be followed in issuing NPDES discharge permits for all new industrial sources, and upon the reissuance of permits for all existing industrial sources, except as provided herein. The following addresses those cases where no discharge of salt may be deemed not to be practicable.

A. New Construction

1. "New construction" is defined as any facility from which a discharge may occur, the construction of which is commenced after October 18, 1975. (Date of submittal of water quality standards as required by 40 CFR 120, December 11, 1974.) Appendix A provides guidance on new construction determination.
 - a. The permitting authority may permit the discharge of salt upon a satisfactory demonstration by the permittee that it is not practicable to prevent the discharge of all salt from proposed new construction.
 - b. The demonstration by the applicant must include information on the following factors relating to the potential discharge:
 - (1) Description of the proposed new construction.
 - (2) Description of the quantity and salinity of the water supply.
 - (3) Description of water rights, including diversions and consumptive use quantities.
 - (4) Alternative plans that could reduce or eliminate salt discharge. Alternative plans shall include:
 - (a) Description of alternative water supplies, including provisions of water reuse, if any.
 - (b) Description of quantity and quality of proposed discharge.
 - (c) Description of how salts removed from discharges shall be disposed of to prevent such salts from entering surface waters or ground-water aquifers.
 - (d) Costs of alternative plans in dollars per ton of salt removed.
 - (5) Of the alternatives, a statement as to the one plan for reduction of salt discharge that the applicant recommends be adopted.

- (6) Such other information pertinent to demonstration of non-practicability as the permitting authority may deem necessary.
- c. In determining what permit conditions shall be required, the permit-issuing authority shall consider, but not be limited to the following:
 - (1) The practicability of achieving no discharge of salt.
 - (2) Where no discharge is determined not to be practicable:
 - (a) The impact of the total proposed salt discharge of each alternative on the lower main stem in terms of both tons per year and concentration.
 - (b) Costs per ton of salt removed from the discharge for each plan alternative.
 - (c) Capability of minimizing salinity discharge.
 - (3) With regard to both points (1) and (2) above, the compatibility of state water laws with either the complete elimination of a salt discharge or any plan for minimizing a salt discharge.
 - (4) The "no-salt" discharge requirement may be waived in those cases where the salt load reaching the main stem of the Colorado River is less than one ton per day, or 350 tons per year, whichever is less. Evaluation will be made on a case-by-case basis.

B. Existing Facilities

- 1. The permitting authority may permit the discharge of salt upon a satisfactory demonstration by the permittee that it is not practicable to prevent the discharge of all salt from an existing facility.
- 2. The demonstration by the applicant must include, in addition to that required under Section I.A.1.b., the following factors relating to the potential discharge:

- a. Existing tonnage of salt discharged and volume of effluent.
 - b. Cost of modifying existing industrial plant to provide for "no-salt" discharge.
 - c. Cost of salt minimization.
- 3. In determining what permit conditions shall be required, the permit issuing authority shall consider the items presented under I.A.1.c.(2), and in addition, the annual costs of plant modification in terms of dollars per ton of salt removed for:
 - a. "No-salt return."
 - b. Minimizing salt return.
- 4. The "no-salt" discharge requirement may be waived in those cases where the salt load reaching the main stem of the Colorado River is less than one ton per day or 350 tons per year, whichever is less. Evaluation will be made on a case-by-case basis.

II. Municipal Discharges

The basic policy is that a reasonable increase in salinity shall be established for municipal discharges to any portion of the Colorado River stream system that has an impact on the lower main stem. The incremental increase in salinity shall be 400 mg/l or less, which is considered to be a reasonable incremental increase above the flow-weighted average salinity of the intake water supply.

- A. The permitting authority may allow a discharge in excess of the 400 mg/l incremental increase at the time of issuance or reissuance of a NPDES discharge permit upon satisfactory demonstration by the permittee that it is not practicable to attain the 400 mg/l limit.
- B. Demonstration by the applicant must include information on the following factors relating to the potential discharge:
 - 1. Description of the municipal entity and facilities.
 - 2. Description of the quantity and salinity of intake water sources.
 - 3. Description of significant salt sources of the municipal wastewater collection system, and identification of entities responsible for each source, if available.

4. Description of water rights, including diversions and consumptive use quantities.
 5. Description of the wastewater discharge, covering location, receiving waters, quantity salt load, and salinity.
 6. Alternative plans for minimizing salt contribution from the municipal discharge. Alternative plans should include:
 - a. Description of system salt sources and alternative means of control.
 - b. Cost of alternative plans in dollars per ton, of salt removed from discharge.
 7. Such other information pertinent to demonstration of non-practicability as the permitting authority may deem necessary.
- C. In determining what permit conditions shall be required, the permit-issuing authority shall consider the following criteria including, but not limited to:
1. The practicability of achieving the 400 mg/l incremental increase.
 2. Where the 400 mg/l incremental increase is not determined to be practicable:
 - a. The impact of the proposed salt input of each alternative on the lower main stem in terms of tons per year and concentration.
 - b. Costs per ton of salt removed from discharge of each alternative plan.
 - c. Capability of minimizing the salt discharge.
- D. If, in the opinion of the permitting authority, the database for the municipal waste discharger is inadequate, the permit will contain the requirement that the municipal waste discharger monitor the water supply and the wastewater discharge for salinity. Such monitoring program shall be completed within two years and the discharger shall then present the information as specified above.
- E. All new and reissued NPDES permits for all municipalities shall require monitoring of the salinity of the intake water supply and the wastewater treatment plant effluent in accordance with the following guidelines:

<u>Treatment Plant Design Capacity</u>	<u>Monitoring Frequency</u>	<u>Type of Sample</u>
<1.0 MGD*	Quarterly	Discrete
1.0 - 5.0 MGD	Monthly	Composite
>5.0 - 50.0 MGD	Weekly	Composite
50.0 MGD	Daily	Composite

*MGD = million gallons per day

1. Analysis for salinity may be either as total dissolved solids (TDS) or be electrical conductivity where a satisfactory correlation with TDS has been established. The correlation should be based on a minimum of five different samples.
2. Monitoring of the intake water supply may be at a reduced frequency where the salinity of the water supply is relatively uniform.

APPENDIX A

Guidance on New Construction Determination

For purposes of determining a new construction, a source should be considered new if by October 18, 1975, there has not been:

- I. Significant site preparation work such as major clearing or excavation;
- II. Placement, assembly or installation of unique facilities or equipment at the premises where such facilities or equipment will be used;
- III. Any contractual obligation to purchase unique facilities or equipment. Facilities and equipment shall include only the major items listed below, provided that the value of such items represents a substantial commitment to construct the facility:
 - A. structures,
 - B. structural materials,
 - C. machinery,
 - D. process equipment, or
 - E. construction equipment; and/or
- IV. Contractual obligation with a firm to design, engineer, and erect a completed facility (i.e., a turnkey plant).

**POLICY
FOR USE OF
BRACKISH AND/OR SALINE WATERS
FOR INDUSTRIAL PURPOSES**

Adopted by
The Colorado River Basin Salinity Control Forum

September 11, 1980

The states of the Colorado River Basin, the federal Executive Department, and the Congress have all adopted as a policy that the salinity in the lower main stem of the Colorado River shall be maintained at or below the flow-weighted average values found during 1972, while the Basin states continue to develop their compact-apportioned waters. In order to achieve this policy, all steps which are practical and within the framework of the administration of states' water rights must be taken to reduce the salt load of the river. One such step was the adoption in 1975 by the Forum of a policy regarding effluent limitations for industrial discharges with the objective of "no-salt return" wherever practicable. Another step was the Forum's adoption in 1977 of the "Policy for Implementation of Colorado River Salinity Standards through the NPDES Permit Program." These policies are part of the basinwide plan of implementation for salinity control which has been adopted by the seven Basin states.

The Forum finds that the objective of maintaining 1972 salinity levels would be served by the exercise of all feasible measures including, wherever practicable, the use of brackish and/or saline waters for industrial purposes.

The summary and page 32 of the Forum's 1978 Revision of the Water Quality Standards for Salinity state: "The plan also contemplates the use of saline water for industrial purposes whenever practicable,..." In order to implement this concept and thereby further extend the Forum's basic salinity policies, the Colorado River Basin states support the Water and Power Resources Service (WPRS) appraisal study of saline water collection, pretreatment and potential industrial use.

The Colorado River Basin contains large energy resources which are in the early stages of development. The WPRS study should investigate the technical and financial feasibility of serving a significant portion of the water requirements of the energy industry and any other industries by the use of Basin brackish and/or saline waters. The Forum recommends that:

- I. The Colorado River Basin states, working with federal agencies, identify, locate and quantify such brackish and/or saline water sources.
- II. Information on the availability of these waters be made available to all potential users.
- III. Each state encourage and promote the use of such brackish and/or saline waters, except where it would not be environmentally sound or economically feasible, or would significantly increase consumptive use of Colorado River System water in the state above that which would otherwise occur.
- IV. The WPRS, with the assistance of the states, encourages and promotes the use of brackish return flows from federal irrigation projects in lieu of fresh water sources, except where it would not be environmentally sound or economically feasible, or would significantly increase consumptive use of Colorado River System water.
- V. The WPRS considers a federal contribution to the costs of industrial use of brackish and/or saline water, where cost-effective, as a joint private-government salinity control measure. Such activities shall not delay the implementation of the salinity control projects identified in Title II of P.L. 93-320.

POLICY
FOR IMPLEMENTATION OF
COLORADO RIVER SALINITY STANDARDS
THROUGH THE NPDES PERMIT PROGRAM
FOR INTERCEPTED GROUND WATER

Adopted by
The Colorado River Basin Salinity Control Forum

October 20, 1982

The States of the Colorado River Basin in 1977 agreed to the "Policy for Implementation of Colorado River Salinity Standards through the NPDES Permit Program" with the objective for industrial discharge being "no-salt return" whenever practicable. That policy required the submittal of information by the applicant on alternatives, water rights, quantity, quality, and costs to eliminate or minimize the salt discharge. The information is for use by the NPDES permit-issuing agency in evaluating the practicability of achieving "no-salt" discharge.

There are mines and wells in the Basin which discharge intercepted ground waters. The factors involved in those situations differ somewhat from those encountered in other industrial discharges. Continued development will undoubtedly result in additional instances in which permit conditions must deal with intercepted ground water.

The discharge of intercepted ground water needs to be evaluated in a manner consistent with the overall objective of "no-salt return" whenever practical. The following provides more detailed guidance for those situations where ground waters are intercepted with resultant changes in ground-water flow regime.

- I. The "no-salt" discharge requirement may be waived at the option of the permitting authority in those cases where the discharged salt load reaching the main stem of the Colorado River is less than one ton per day or 350 tons per year whichever is less. Evaluation will be made on a case-by-case basis.
- II. Consideration should be given to the possibility that the ground water, if not intercepted, normally would reach the Colorado River System in a reasonable time frame. An industry desiring such consideration must provide detailed information

*The term "intercepted ground water" means all ground water encountered during mining or other industrial operations.

including a description of the topography, geology, and hydrology. Such information must include direction and rate of ground-water flow; chemical quality and quantity of ground water; and the location, quality, and quantity of surface streams and springs that might be affected. If the information adequately demonstrates that the ground water to be intercepted normally would reach the river system in a reasonable time frame and would contain approximately the same or greater salt load than if intercepted, and if no significant localized problems would be created, then the permitting agency may waive the "no-salt" discharge requirement.

III. In those situations where the discharge does not meet the criteria in I or II above, the applicant will be required to submit the following information for consideration:

- A. Description of the topography, geology, and hydrology. Such information must include the location of the development, direction and rate of ground-water flow, chemical quality and quantity of ground water, and relevant data on surface streams and springs that are or might be affected. This information should be provided for the conditions with and without the project.
- B. Alternative plans that could substantially reduce or eliminate salt discharge. Alternative plans must include:
 - 1. Description of water rights, including beneficial uses, diversions, and consumptive use quantities.
 - 2. Description of alternative water supplies, including provisions for water reuse, if any.
 - 3. Description of quantity and quality of proposed discharge.
 - 4. Description of how salts removed from discharges shall be disposed of to prevent their entering surface waters or ground-water aquifers.
 - 5. Technical feasibility of the alternatives.
 - 6. Total construction, operation, and maintenance costs; and costs in dollars per ton of salt removed from the discharge.
 - 7. Closure plans to ensure termination of any proposed discharge at the end of the economic life of the project.

8. A statement as to the one alternative plan for reduction of salt discharge that the applicant recommends be adopted, including an evaluation of the technical, economic, and legal practicability of achieving no discharge of salt.
 9. Such information as the permitting authority may deem necessary.
- IV. In determining whether a "no-salt" discharge is practicable, the permit-issuing authority shall consider, but not be limited to, the water rights and the technical, economic, and legal practicability of achieving no discharge of salt.
- V. Where "no-salt" discharge is determined not to be practicable the permitting authority shall, in determining permit conditions, consider:
- A. The impact of the total proposed salt discharge of each alternative on the lower main stem in terms of both tons per year and concentration.
 - B. Costs per ton of salt removed from the discharge for each plan alternative.
 - C. The compatibility of state water laws with each alternative.
 - D. Capability of minimizing salinity discharge.
 - E. The localized impact of the discharge.
 - F. Minimization of salt discharges and the preservation of fresh water by using intercepted ground water for industrial processes, dust control, etc. whenever it is economically feasible and environmentally sound.

POLICY
FOR IMPLEMENTATION OF
COLORADO RIVER SALINITY STANDARDS
THROUGH THE NPDES PERMIT PROGRAM
FOR FISH HATCHERIES

Adopted by
The Colorado River Basin Salinity Control Forum

October 28, 1988

The states of the Colorado River Basin in 1977 adopted the "Policy for Implementation of Colorado River Salinity Standards through the NPDES Permit Program." The objective was for "no-salt return" whenever practicable for industrial discharges and an incremental increase in salinity over the supply water for municipal discharges. The Forum addressed the issue of intercepted ground water under the 1977 policy, and adopted a specific policy dealing with that type of discharge.

A specific water use and associated discharge which has not been here-to-fore considered is discharges from fish hatcheries. This policy is limited exclusively to discharges from fish hatcheries within the Colorado River Basin. The discharges from fish hatcheries need to be addressed in a manner consistent with the 1977 and 1980 Forum policies.

The basic policy for discharges from fish hatcheries shall permit an incremental increase in salinity of 100 mg/l or less above the flow weighted average salinity of the intake supply water. The 100 mg/l incremental increase may be waived if the discharged salt load reaching the Colorado River system is less than one ton per day, or 350 tons per year, whichever is less. Evaluation is to be made on a case-by-case basis.

- I. The permitting authority may permit a discharge in excess of the 100 mg/l incremental increase at the time of issuance or reissuance of a NPDES discharge permit. Upon satisfactory demonstration by the permittee that it is not practicable to attain the 100 mg/l limit.
- II. Demonstration by the applicant must include information on the following factors relating to the potential discharge:
 - A. Description of the fish hatchery and facilities.
 - B. Description of the quantity and salinity of intake water sources.
 - C. Description of salt sources in the hatchery.

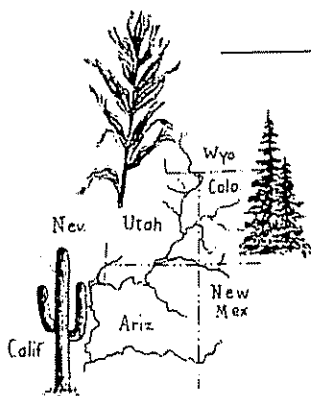
- D. Description of water rights, including diversions and consumptive use quantities.
 - E. Description of the discharge, covering location, receiving waters, quantity salt load, and salinity.
 - F. Alternative plans for minimizing salt discharge from the hatchery. Alternative plans should include:
 - 1. Description of alternative means of salt control.
 - 2. Cost of alternative plans in dollars per ton, of salt removed from discharge.
 - G. Such other information pertinent to demonstration of non-practicability as the permitting authority may deem necessary.
- III. In determining what permit conditions shall be required, the permit-issuing authority shall consider the following criteria including, but not limited to:
- A. The practicability of achieving the 100 mg/l incremental increase.
 - B. Where the 100 mg/l incremental increase is not determined to be practicable:
 - 1. The impact of the proposed salt input of each alternative on the lower main stem in terms of tons per year and concentration.
 - 2. Costs per ton of salt removed from discharge of each alternative plan.
 - 3. Capability of minimizing the salt discharge.
- IV. If, in the opinion of the permitting authority, the database for the hatchery is inadequate, the permit will contain the requirement that the discharger monitor the water supply and the discharge for salinity. Such monitoring program shall be completed within two years and the discharger shall then present the information as specified above.
- V. All new and reissued NPDES permits for all hatcheries shall require monitoring of the salinity of the intake water supply and the effluent at the time of peak fish population.
- A. Analysis for salinity may be either as total dissolved solids (TDS) or be electrical conductivity where a satisfactory correlation with TDS has been established. The correlation should be based on a minimum of five different samples.

APPENDIX B

**Forum letter to EPA Regional Administrators,
Regions VIII and IX, dated February 26, 1990**

and

EPA Regulation 40 CFR, Part 120



February 26, 1990

Daniel W. McGovern
Regional Administrator
EPA Region IX
215 Fremont Street
San Francisco, CA 94105

James Scherer
Regional Administrator
EPA Region VIII
999 18th Street
Denver Place, Suite 500
Denver, CO 80202-2405

Dear Messrs. McGovern and Scherer:

The Colorado River Basin States have submitted to you the 1987 Review of Water Quality Standards for Salinity, Colorado River. In approving the Review as submitted to you by California, Nevada, and Wyoming, you commented in your approval letters (enclosed) that for the 1990 Review, the States and the Forum should address certain aspects of the water quality standards and the associated plan of implementation.

The requests in those approval letters have led to significant discussions between the Forum and your staff. A great deal of uncertainty initially prevailed as to precisely what EPA was requesting from the states within the approval letters. After lengthy discussions, it was agreed that the Forum would restate in writing precisely what the States believe the standards were, as initially adopted in the mid 1970s by the States and approved by EPA. We also contend that the standards have been unchanged and continue as the standards for Colorado River salinity today.

While some documentation exists of earlier discussions held between the states and EPA pursuant to requirements of the Clean Water Act, the first formal Forum document concerning standards was Water Quality Standards for Salinity, Including Numeric Criteria and Plan of Implementation for Salinity Control, Colorado River System, prepared by the Colorado River Basin Salinity Control Forum, June 1975. The document submitted by each State was approved by EPA and has been the basis for the triennial reviews since 1975.

GOVERNORS

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George Deukmejian, CA
Roy Romer, CO
Robert Miller, NV
Gorrey Carruthers, NM
Norman H. Bongert, UT
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Don S. Budd
EXECUTIVE DIRECTOR
Jack A. Barnett

Perhaps the best way to clearly state the standards, which have not changed since the 1975 submittal, is to quote directly from the EPA-approved 1975 report of the Forum. In the report, it is noted that EPA, pursuant to requirements of Section 303 of Public Law 92-500, adopted regulations in the Federal Register on December 18, 1974, concerning the establishing of the Colorado River salinity control policy and standard procedure. The 1975 report then (on page 54) states:

. . . the numeric criteria for the Colorado River System are to be established at levels corresponding to the flow-weighted average concentrations in the lower main stem during calendar year 1972.

The report then goes on to state that numeric criteria are to be established at three key stations: below Hoover Dam, below Parker Dam, and at Imperial Dam. The report then states:

The flow-weighted average annual salinity for the year 1972 was used. These values were determined by the Bureau of Reclamation from daily flow and salinity data collected by the U. S. Geological Survey and the Bureau of Reclamation. They are as follows:

<i>Below Hoover Dam</i>	<i>723 mg/l</i>
<i>Below Parker Dam</i>	<i>747 mg/l</i>
<i>Imperial Dam</i>	<i>879 mg/l</i>

It may be helpful to state what is meant by the term "flow-weighted average annual salinity" and to further state how that flow-weighted average annual salinity was calculated in 1972 and how it is calculated today. The term was first used formally by EPA in the December 18, 1974, Federal Register and was carried forward by the States to the 1975 standards. The average daily flow of the river past each of these three measuring points is determined, and the average concentration of salts in the water in milligrams per liter (mg/l) (daily salinity) is also determined each day at each of these three measuring points.

For each day, the average daily flow is multiplied by the daily salinity concentration, resulting in a flow/salinity mass number. For all 365 days of the year, the daily mass numbers are added together, resulting in an annual mass number. The sum of average daily flow (in cfs) of the river past the gage for the entire year is also calculated. The total mass number is then divided by the sum of each average daily flow for the year, and the resulting product is the flow-weighted average annual salinity for the calendar year at that station.

It may be helpful to note that 1972 was picked as the year upon which to base the standards. There are no inferences that anyone felt that 1972 represented a typical or average year. The States

concur with the EPA regulation published in December of 1974 which stated in part:

The flow-weighted average annual salinity in the lower main stem of the Colorado River System is to be maintained at or below the average value found during 1972.

There are two other aspects of the water quality standards on the Colorado River which should be noted. First, controlling the salinity of the Colorado River is significantly different than dealing with man-induced, unnatural pollutants in other river systems. The Colorado River is naturally heavily laden with salts. The standards require that a program be developed that will maintain the flow-weighted average annual salinity at or below the 1972 levels while the Basin States continue to develop their compact-apportioned water supply. The program was not established to reduce the salinity of the river below levels that were caused by natural sources and man's efforts prior to 1972, but to counteract the effects of development of water resources in the Colorado River Basin after 1972.

The flow in the river system will fluctuate with the amount of precipitation that the river basin receives from year to year. The salinity concentrations also are strongly influenced by the volume of the flow in the river. Therefore, there will be variations from the numeric criteria brought about by fluctuations in the river flow unrelated to man's activities. This was made abundantly clear in several documents; a July 1, 1977, letter from Douglas M. Costle, the Administrator of EPA, to the Environmental Defense Fund clearly states this understanding.

The Salinity Control Program that has been adopted by the States, agencies of the Federal Government, and approved by EPA is intended to remove enough salt from the river system to maintain salinity levels at or below the 1972 levels as far as it may be determined that development and/or man's activities has impacted the salinity levels. The program is not, however, intended to counteract the salinity fluctuations that are a result of the highly variable flows. The 1975 report of the Forum which was sent to EPA clearly acknowledges this. On page 56 the report states:

It should be recognized that the river system is subject to highly variable annual flow. The frequency, duration and availability of carryover storage greatly affect the salinity of the lower main stem and, therefore, it is probable that salinity levels will exceed the numeric criteria in some years and be well below the criteria in others. However, under the above assumptions, the average salinity will be maintained at or below 1972 levels.

Quoting from page 57 of the report, we find:

Periodic increases above the criteria as a result of reservoir conditions or periods of below long-time average annual river flow also will be in conformance with the regulation. With satisfactory reservoir conditions and when river flows return to the long-time average annual flow or above, concentrations are expected to be at or below the criteria level.

The phrase quoted above, "long-time average annual flow," means an average of 15 million acre-feet per year. The 15 million acre-feet per year is the long-term virgin flow measured at Lee Ferry for the period of record when the standards were adopted.

The second aspect of the standards adopted in 1975 is that they provide for one additional deviation from the 1972 levels. This deviation has been termed a "temporary increase" and it should not be confused with the natural variations discussed in the previous paragraphs. On page 56 of the 1975 Review we quote:

The federal regulations provide for temporary increases above the 1972 levels if control measures are included in the plan. Should water development projects be completed before control measures are identified or brought on line, temporary increases above the criteria could result and these increases will be in conformance with the regulation. With completion of control projects, those now in the plan or those to be added subsequently, salinity would return to or below the criteria level.

The standards include the numeric criteria established by the Basin States in 1975 pursuant to formal regulations set forth by EPA were approved by EPA, and the standards and the numeric criteria have not changed. Since 1975, the numeric criteria have not been exceeded.

In connection with each of the triennial reviews, the Forum has identified what is believed to be the most feasible and cost-effective plan for the construction of salinity control units or the implementation of salinity control strategies so that the numeric criteria will not be exceeded. The analysis also includes a determination as to the year in which each of the elements of the salinity control plan must be built and/or implemented in order to prevent the numeric criteria from being exceeded. From time to time the Bureau of Reclamation, the Department of Agriculture, and the Forum have developed jointly agreed upon implementation plans to ensure that future water quality standards can be met. Following the adoption by the Forum, the plans are made a part of the triennial review and are formally published in the Forum's triennial review document.

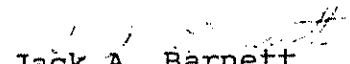
Messieurs McGovern & Scherer
February 26, 1990
Page 5

The most recent plan of implementation as adopted by the Basin States is described in the 1987 triennial review within Chapter IV. That chapter adequately describes the overall program, which includes major efforts of the Bureau of Reclamation and the Department of Agriculture as well as contributing efforts from other federal agencies such as the Bureau of Land Management, the Fish and Wildlife Service, the Geological Survey and your own agency. The States cost share in expenditures authorized for the Bureau of Reclamation and the Department of Agriculture. Chapter V describes additional efforts to be undertaken by the States as a part of the salinity control plan of implementation.

For your convenience in reviewing the current plan, we have enclosed page 25 from the 1987 Review. It contains a table indicating the Department of Agriculture and Bureau of Reclamation units which are to be constructed to remove 1,177,300 tons of salt. The table indicates the time of construction anticipated for each of the various units, with some projects already having been completed, some projects currently under construction, and the most-remote project being completed by the year 2008.

We trust that this letter fully describes the water quality standards for the Colorado River with respect to salinity. It is our intention that the plan to be adopted in the 1990 Review will, as did the plan in the 1987 Review, remove enough salts from the river system to ensure compliance with the water quality standards, as set forth in this letter, in all of the years through the period of projected salinities to 2010. As the program moves ahead and we approach the turn of the century, the Forum will address the need for a salinity control program which looks beyond the year 2010. We believe this letter fully answers issues raised in the letters to California, Nevada, and Wyoming and further answers issues raised by the your staff in subsequent expanded conversations concerning the standards. Should you have additional questions, we would welcome your inquiry.

Sincerely,


Jack A. Barnett
Executive Director

hsm
enclosures

cc: Robert E. Layton, Jr.

JAN 20 1989

4 JAN 1989

Mr. W. Don Maughan
Chairman
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95801

Dear Mr. Maughan:

The U.S. Environmental Protection Agency, Region 9, has reviewed California's triennial review of water quality standards for salinity in the Colorado River System as contained in the State Water Resources Control Board Resolution No. 88-27 adopted March 17, 1988. This resolution incorporates the Colorado River Basin Salinity Control Forum 1987 review entitled "Water Quality Standards for Salinity - Colorado River System, May 1987" and supplement thereto dated August 1987. Based upon EPA's review, it is my pleasure to inform you of EPA's approval of California's reaffirmation of water quality standards for salinity pursuant to Section 303(c) of the Clean Water Act and its implementing regulations (40 CFR Part 131, November 8, 1983).

This action is based upon my determination that these water quality standards are consistent with the protection of the public health and welfare, the protection of water quality and the intent and purposes of the Clean Water Act. The plan of implementation for salinity control included in the Forum report and submitted by California, indicates a commitment by each of the seven basin States to maintain the criteria and protect designated uses throughout the Basin. This commitment is essential to EPA's approval of the water quality standards for salinity.

It appears that the current plan of implementation is adequate for at least the next three years. However, EPA would like to see the plan of implementation increase the probability of compliance with the salinity standards in the longer term. We ask the State to work with the Forum during the next triennial review of the salinity standards to address our concerns regarding the frequency of compliance in more detail. We will cooperate with California, the other Basin States, and the involved Federal agencies during the triennial review process. We plan to discuss these concerns in more detail at the Forum meeting scheduled in March.

I commend the State of California and the Colorado River Basin Salinity Control Forum for their cooperation in working with EPA to update this basinwide plan to control salinity. Since salinity is a basinwide problem, EPA will exercise its authority under Section 303(c) of the Act to reassess the State's approach to salinity control if a basinwide approach is not maintained.

This Agency continues to support the Basin States' concept that salinity is a basinwide problem and recognizes the State's commitment to implement salinity control measures. It is further recognized that, without implementation of State and local salinity control measures, the criteria for the salinity standards could be seriously jeopardized. EPA, in its administration of the Clean Water Act, intends to ensure that all Colorado River Basin States aggressively develop and implement programs for salinity control.

The plan of implementation submitted as a part of California's water quality standards for salinity contains Federal projects authorized by the Colorado River Basin Salinity Control Act. EPA's support for this plan does not constitute a commitment by the Federal Government to fund these projects or their equivalents.

In future review efforts, EPA will continue to support adoption of vigorous implementation of the basinwide salinity control program. EPA looks forward to working with you and your staff toward our mutual goal of protecting and enhancing the quality of California's waters.

Sincerely,

Daniel W. McGovern
Regional Administrator

FEB - 2 1989



20 JAN 1989

Mr. Melvin Close, Jr.
Chairman
Nevada State Environmental Commission
Capitol Complex, Room 221
201 South Fall Street
Carson City, NV 89710

Dear Mr. Close:

The U.S. Environmental Protection Agency, Region 9, has reviewed Nevada's triennial review of water quality standards for salinity in the Colorado River System as approved by the State Environmental Commission on May 24, 1988. This approval was transmitted to us by Wendell McCurry's letter of November 21, 1988 and incorporates the Colorado River Basin Salinity Control Forum 1987 review entitled "Water Quality Standards for Salinity - Colorado River System, May 1987" and supplement thereto dated August 1987. Based upon EPA's review, it is my pleasure to inform you of EPA's approval of Nevada's reaffirmation of water quality standards for salinity pursuant to Section 303(c) of the Clean Water Act and its implementing regulations (40 CFR Part 131, November 8, 1983).

This action is based upon my determination that these water quality standards are consistent with the protection of the public health and welfare, the protection of water quality and the intent and purposes of the Clean Water Act. The plan of implementation for salinity control included in the Forum report and submitted by Nevada, indicates a commitment by each of the seven basin States to maintain the criteria and protect designated uses throughout the Basin. This commitment is essential to EPA's approval of the water quality standards for salinity.

It appears that the current plan of implementation is adequate for at least the next three years. However, EPA would like to see the plan of implementation increase the probability of compliance with the salinity standards in the longer term. We ask the State to work with the Forum during the next triennial review of the salinity standards to address our concerns regarding the frequency of compliance in more detail. We will cooperate with Nevada, the other Basin States, and the involved Federal agencies during the triennial review process. We plan to discuss these concerns in more detail at the Forum meeting scheduled in March.

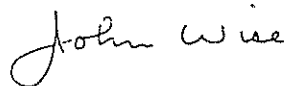
I commend the State of Nevada and the Colorado River Basin Salinity Control Forum for their cooperation in working with EPA to update this basinwide plan to control salinity. Since salinity is a basinwide problem, EPA will exercise its authority under Section 303(c) of the Act to reassess the State's approach to salinity control if a basinwide approach is not maintained.

This Agency continues to support the Basin States' concept that salinity is a basinwide problem and recognizes the State's commitment to implement salinity control measures. It is further recognized that, without implementation of State and local salinity control measures, the criteria for the salinity standards could be seriously jeopardized. EPA, in its administration of the Clean Water Act, intends to ensure that all Colorado River Basin States aggressively develop and implement programs for salinity control.

The plan of implementation submitted as a part of Nevada's water quality standards for salinity contains Federal projects authorized by the Colorado River Basin Salinity Control Act. EPA's support for this plan does not constitute a commitment by the Federal Government to fund these projects or their equivalents.

In future review efforts, EPA will continue to support adoption of vigorous implementation of the basinwide salinity control program. EPA looks forward to working with you and your staff toward our mutual goal of protecting and enhancing the quality of Nevada's waters.

Sincerely,



for Daniel W. McGovern
Regional Administrator



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII

999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405
JUN 16 1989

JUN 1 1989

JUN 21 1989

Ref: 8WM-SP

Honorable Mike Sullivan
Governor of Wyoming
State Capitol
Cheyenne, Wyoming 82002

RE: Wyoming Statewide Water
Quality Management Plan

Dear Governor Sullivan:

The U.S. Environmental Protection Agency, Region VIII, has reviewed your certification of an amendment to the Wyoming Statewide Water Quality Management (WQM) Plan entitled Proposed Report and Supplement, 1987 Review Water Quality Standards for Salinity Colorado River System. The 1987 Review was published by the Colorado River Basin Salinity Control Forum (Forum). Based upon EPA's review, it is my pleasure to inform you of EPA's approval of the amendment pursuant to Section 208 of the Clean Water Act (the Act) and its implementing regulations (40 CFR Part 130, January 11, 1985.)

No changes in the downstream salinity numeric criteria are proposed. However, the plan of implementation for salinity control included in the 1987 Review and submitted by Wyoming is revised. It indicates a commitment by each of the seven Basin States to maintain the criteria and protect designated uses throughout the Basin. This commitment is essential to EPA's continued approval of the water quality standards for salinity.

It appears that the plan of implementation is adequate for at least the next three years. However, EPA would like to see the plan of implementation increase the probability of compliance with the salinity standards in the longer term. Our concerns and opportunities for addressing the concerns were discussed in detail with the Forum at its October 1988 and May 1989 meetings. We ask the State to work with the Forum during the next triennial review of the salinity standards to address our concerns regarding the frequency of compliance in more detail. I believe that our concerns on frequency of compliance are important and must be resolved by the end of the next triennial review. In addition, we will cooperate with Wyoming, the other Basin States, and the involved Federal agencies during the triennial review process pursuant to Section 303(c) of the Act. We suggest that Chapter VI of the Wyoming Water Quality Standards "Rules and

Regulations" be amended to provide an appropriate linkage between the salinity standards regulations and the WQM Plan/Amendments.

I commend the State of Wyoming and the other states of the Forum for their cooperation in working with EPA to update the Basinwide plan to control salinity. This Agency continues to support the Basin states' concept that salinity is a basinwide problem and recognizes the state's commitment to implement salinity control measures. It is further recognized that, without implementation of state and local salinity control measures, the criteria for the salinity standards could be seriously jeopardized.

The plan of implementation submitted contains Federal projects authorized by the Colorado River Basin Salinity Control Act. EPA's support for this plan does not constitute a commitment by the Federal Government to fund these projects or their equivalents.

In future review efforts, EPA will continue to support adoption of vigorous implementation of the Basinwide salinity control program. EPA looks forward to working with you and your staff toward our mutual goal of protecting and enhancing the quality of Wyoming's waters.

Sincerely,



James J. Scherer
Regional Administrator

cc: Alan Edwards, Interim Director, Wyoming DEQ
✓Larry Robinson, Wyoming DEQ
Jack Barnett, Colorado River Basin
Salinity Control Forum

Table 3
Recommended Salinity Control Plan
Implementation Schedule

	Begin Implemen- tation	Projected Date Complete	Tons/yr Removed Jan 1987	Projected Salt Removed Tons/yr
Meeker Dome (USBR)	Complete	1983	48,000	
Grand Valley Stage One (USBR)	Complete	1984	21,900	
BLM well plugging & nonpoint	Complete	1986	7,600	
Las Vegas Wash Pittman (USBR)	Complete	1985	7,000	
Grand Valley (USDA)	1979	2000	33,600	196,400
Paradox Valley (USBR)	1980	1990		180,000
Uinta Basin (USDA)	1980	2003	22,700	75,500
Grand Valley Stage Two (USBR)	1985	2003		113,100
Las Vegas Wash Whitney (USBR)	1986	1988		1,000
Big Sandy River (USDA)	1989	1996		52,900
Dolores Project (McElmo, USBR)	1989	1994		24,500
Lower Gunnison Win Wtr (USBR)	1989	1991		74,000
Lower Gunnison I (USDA)	1989	2006		82,100
Moapa Valley (USDA)	1990	1993		19,500
Lower Gunnison 2, Mont. (USDA)	1991	2008		81,700
Lower Gunnison 2, Delta (USDA)	1991	2004		104,700
McElmo Creek (USDA)	1990	1999		38,000
Lower Gunnison 3, (USDA)	1992	1995		12,000
Uinta Basin I (USBR)	1993	2000		25,500
<u>1/</u> Price-San Rafael (Coordinated)	1992	1998		52,300
Lower Virgin River (USBR)	1992	1994		44,100
			140,800	1,177,300 <u>2/</u>

Others under consideration, not included in the plan.

San Juan River (USBR)
Sinbad Valley (USBR)
Mancos Valley (USDA)
Lower Gunnison Stage I Balance (USBR)
Lower Gunnison North Fork (USBR)
Grand Valley II Balance (USBR)
Las Vegas Wash Balance (USBR)
Virgin Valley (USDA)

1/ Not included in USDA implementation plan.

2/ Reduction to maintain the numeric criteria through 2010.

Title 40—Protection of Environment
CHAPTER I—ENVIRONMENTAL
PROTECTION AGENCY
[FRL 298-6]

PART 120—WATER QUALITY
STANDARDS

Colorado River System; Salinity Control
Policy and Standards Procedures

The purpose of this notice is to amend 40 CFR Part 120 to set forth a salinity control policy and procedures and requirements for establishing water quality standards for salinity and a plan of implementation for salinity control in the Colorado River System which lies within the States of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming pursuant to section 303 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1313). A notice proposing such policy and standards procedures was issued on June 10, 1974 (39 FR 20703, 39 FR 24517).

High salinity (total dissolved solids) is recognized as a significant water quality problem causing adverse impacts on water uses. Salinity concentrations are affected by two basic processes: (a) Salt loading—the addition of mineral salts from various natural and man-made sources, and (b) salt concentrating—the loss of water from the system through stream depletion.

Studies to date have demonstrated that the high salinity of stream systems can be alleviated. Although further study may be required to determine the economic and technical feasibility of controlling specific sources, sufficient information is available to develop a salinity control program.

Salinity standards for the Colorado River System would be useful in the formulation of an effective salinity control program. In developing these standards, the seven States must cooperate with one another and the Federal Government to support and implement the conclusions and recommendations adopted April 27, 1972, by the reconvened 7th Session of the Conference in the Matter of Pollution of the Interstate Waters of the Colorado River and its Tributaries.

Public hearings on the proposed regulation were held in Las Vegas, Nevada, on August 19, 1974, and in Denver, Colorado, on August 21, 1974. Public comments were provided at the hearings and also by letter during the review period. A summary of major comments and Environmental Protection Agency response follows:

(1) The Colorado River Basin Salinity Control Forum stated that it did not object to the proposed regulation, and believed that it satisfied the requirements of section 303(b)(2) of P.L. 92-500 until October 18, 1975. The Forum reported that the seven Colorado River Basin States were actively working on the development of water quality standards and a plan of implementation for salinity control.

(2) The Colorado River Water Conservation District inquired as to whether

the definition of the Colorado River Basin contained in Article II(f) of the Colorado River Compact of 1922 would be followed in the development of salinity standards and the salinity control plan.

The requirement for establishing water quality standards and an implementation plan apply to the Colorado River System as defined in Part 120.5(a) of this regulation. This definition is consistent with the definition of the Colorado River System contained in Article II(a) of the Compact. The regulation states that the salinity problem shall be treated as a basinwide problem. Articles II(f) and II(g) define the Basin to include the System plus areas outside the drainage area which are served by the Colorado River System. The Environmental Protection Agency (EPA) will require that the standards and implementation plan consider the impacts of basinwide uses, e.g., transmountain diversions, on salinity effects in the System, but the establishment of standards and implementation plans pursuant to this regulation will not be required for streams located outside the System.

The District also questioned the feasibility of relying on irrigation improvement programs as a means of alleviating the salinity problem.

EPA believes that adequate information is available to initiate controls for irrigated agriculture, yet at the same time acknowledges that additional work is needed to demonstrate the efficacy of certain control measures. Projects presently being supported by EPA and others should demonstrate the adequacy of various control measures including management and non-structural techniques. These measures will be considered during the development of the implementation plan.

(3) The Environmental Defense Fund (EDF) testified that it believed that EPA was not complying with the requirements of the Federal Water Pollution Control Act, as amended, chiefly because of EPA's late response to the timetable delineated in the Act for establishing standards, and also because numerical standards still have not been set for the Colorado River System. EDF called upon EPA to withdraw the proposed regulation and promptly promulgate numerical limits for salinity.

EPA believes that a move to promulgate numerical standards at this time could cause even further delays in controlling salinity due to the problems involved with obtaining interstate cooperation and public acceptance of such a promulgation.

(4) The Sierra Club raised a number of objections to the proposed regulation, principally because, in its opinion, it permits further development of the waters of the Colorado River without requiring that adequate salinity controls be on line prior to development. Specific suggestions are:

(a) Section 120.5(c)(3). Shorten the deadline for submission of the standards and implementation plan to May 30, 1975.

EPA believes that this would not allow adequate time due to the complexities of the problem, the interstate coordination needed and the time requirements for public hearings. The October 18, 1975, date is consistent with the requirements of the Federal Water Pollution Control Act, as amended, for the three year review and revision of standards. The schedule set forth by the Colorado River Basin Salinity Control Forum calls for development of draft standards and an implementation plan by February 1975 in order to allow time for public participation prior to promulgation.

(b) Section 120.5(c)(2). Delete "as expeditiously as practicable."

The date of July 1, 1983, remains the goal for accomplishment of implementation plans as stated in § 120.5(c)(3)(iii). It is the purpose of this language to accelerate progress by the States toward this goal where possible.

(c) Section 120.5(c)(2)(ii). Delete "while the basin States continue to develop their compact apportioned waters."

In recognition of the provisions of the Colorado River Compact of 1922 and until such time that the relationship between the Compact and the Federal Water Pollution Control Act, as amended, is clarified, EPA believes that development may proceed provided that measures are taken to offset the salinity increases resulting from further development.

(d) Section 120.5(c)(2)(iv). Add language to describe conditions under which temporary increases above the 1972 levels will be allowed.

EPA believes that this matter should be addressed in further detail in the formulation, review and acceptance of the implementation plan, not in the regulation.

(e) Add a new subsection on financing of control measures.

EPA believes that this, too, is an issue that should be handled as part of the implementation plan.

(f) Add a new subsection delineating requirements for evaluating control plans and restricting consideration of controls for the Blue Spring on the Little Colorado River.

EPA believes these issues should also be addressed as part of the implementation plan. It should be noted that nothing in this regulation removes the requirement for assessing environmental impacts and preparing environmental impact statements for control measures.

(g) Add a new section requiring public hearings.

EPA's public participation regulations appear at 40 CFR 105 and apply to all actions to be taken by the States and Federal Government pursuant to the Act. States have provided for public participation throughout the initial water quality standards review process. We expect the States to do so in this situation and see no need to set forth additional requirements.

(h) Add a new section stating that the implementation plan will be published in the FEDERAL REGISTER.

EPA expects there will be substantial public participation at the State and local level prior to adoption of the plan. The salinity standards are expected to be published in the FEDERAL REGISTER, but the size and complexity of the plan may militate against its publication. At the very least, the plan will be available for review at appropriate EPA and State offices. Notice of its availability will be published in the FEDERAL REGISTER, and 60 days will be allowed for public review and comment.

(i) Add a new subsection stating that EPA will promulgate standards if the States fail to do so as prescribed in this regulation.

Section 303 of the Federal Water Pollution Control Act provides for promulgation by EPA where the States fail to adopt standards requested by the Administrator, or where the Administrator determines Federal promulgation is necessary to carry out the purposes of the Act. EPA's responsibility to promulgate standards if the States fail to do so is thus expressed in the statute itself; the Agency does not believe that recitation of the statutory duty in this particular rulemaking is necessary.

(5) The American Farm Bureau Federation, California Farm Bureau Federation, Nevada Farm Bureau Federation, and the New Mexico Farm and Livestock Bureau believe that standards should not be set until further evaluation of the problems and opportunities for control are completed.

EPA believes that adequate information is available for setting standards and formulating controls, and while it recognizes that additional work is needed on specific aspects of solutions, it believes that further delay without any action is not appropriate.

Records of the hearings and comments received by letter during the review period are available for public inspection at the regional offices of the Environmental Protection Agency at 1860 Lincoln Street in Denver, Colorado, at 100 California Street in San Francisco, California, at 1609 Patterson Street in Dallas, Texas, and at the Environmental Protection Agency Freedom of Information Center at 401 M Street SW in Washington, D.C.

This regulation sets forth a policy of maintaining salinity concentrations in the lower main stem of the Colorado River at or below 1972 average levels and requires the Colorado River System States to promulgate water quality standards and a plan for meeting the standards. The first step will be the establishment of procedures within 30 days of the effective date of these regulations which will lead to adoption on or before October 18, 1975, of water quality standards for salinity including numeric criteria and an implementation plan for salinity control.

Except as provided in this regulation, the interstate and intrastate standards previously adopted by the States of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming and approved by the Environmental Protection

Agency are the effective water quality standards under section 303 of the Act for interstate and intrastate waters within those States. Where the regulations set forth below are inconsistent with the referenced state standards, these regulations will supersede such standards to the extent of the inconsistency.

In consideration of the foregoing, 40 CFR Part 120 is amended as follows:

1. Section 120.5 is added to read as set forth below:

§ 120.5 Colorado River System Salinity Standards and Implementation Plan.

(a) "Colorado River System" means that portion of the Colorado River and its tributaries within the United States of America.

(b) It shall be the policy that the flow weighted average annual salinity in the lower main stem of the Colorado River System be maintained at or below the average value found during 1972. To carry out this policy, water quality standards for salinity and a plan of implementation for salinity control shall be developed and implemented in accordance with the principles of paragraph (c) below.

(c) The States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming are required to adopt and submit for approval to the Environmental Protection Agency on or before October 18, 1975:

(1) Adopted water quality standards for salinity including numeric criteria consistent with the policy stated above for appropriate points in the Colorado River System; and,

(2) A plan to achieve compliance with these standards as expeditiously as practicable providing that:

(i) The plan shall identify State and Federal regulatory authorities and programs necessary to achieve compliance with the plan.

(ii) The salinity problem shall be treated as a basinwide problem that needs to be solved in order to maintain lower main stem salinity at or below 1972 levels while the basin States continue to develop their compact apportioned waters.

(iii) The goal of the plan shall be to achieve compliance with the adopted standards by July 1, 1983. The date of compliance with the adopted standards shall take into account the necessity for Federal salinity control actions set forth in the plan. Abatement measures within the control of the States shall be implemented as soon as practicable.

(iv) Salinity levels in the lower main stem may temporarily increase above the 1972 levels if control measures to offset the increases are included in the control plan. However, compliance with 1972 levels shall be a primary consideration.

(v) The feasibility of establishing an interstate institution for salinity management shall be evaluated.

(d) The States are required to submit to the respective Environmental Protection Agency Regional Administrator established procedures for achieving (c)

(1) and (c) (2) above within 30 days of the effective date of these regulations and to submit progress reports quarterly thereafter. EPA will on a quarterly basis determine the progress being made in the development of salinity standards and the implementation plan.

§ 120.10 [Amended]

§ 120.10 is amended by adding to the paragraphs entitled "Arizona", "California", "Colorado", "Nevada", "New Mexico", "Utah", and "Wyoming" a salinity control policy and procedures and requirements for establishing water quality standards for salinity control in the Colorado River System.

(Sec. 303, Pub. L. 92-500, 86 Stat. 816 (33 U.S.C. 1313))

Effective date: December 18, 1974.

Dated: December 11, 1974.

APPENDIX C

List of NPDES Permits

LEGEND

NPDES PERMITS
EXPLANATION CODES

COLORADO RIVER BASIN SALINITY CONTROL FORUM

NPDES permits are reviewed under two different criterium under Forum policy: these being municipal and industrial. In order for a permittee to be in compliance under the municipal criterium, the increase in concentration between inflow and outflow can not be greater than 400 mg/l. Forum industrial criterium requires that no industrial user discharges more than 1.00 tons/day. Under Forum policy there can be granted exceptions to these limitations by the States. The following gives an explanation of the current status of the NPDES permits. Because at any given time many of the approximate 600 permits identified in this list are being reviewed, reissued, and/or terminated, and new discharge permits are being filed, this list must be considered as being subject to frequent change.

MUNICIPAL

INDUSTRIAL

- | | |
|---|--|
| (M) Municipal user in compliance with Forum policy. | (I) Industrial user in compliance with Forum policy. |
| (M-1) Permit has expired or been revoked. No discharge. | (I-1) Permit has expired or been revoked. No discharge. |
| (M-2) Permittee is not currently discharging. | (I-2) Permittee is not currently discharging. |
| (M-3) Measurement of TDS is not currently required, but the state plans to require measurements of both inflow and outflow when the permit is reissued. | (I-3) Measurement of TDS is not currently required, but the state plans to require measurements of both volume and concentration of outflow when the permit is reissued. |
| (M-4) Measurements of inflow are not consistent with Forum policy: | (I-4) Either concentration or volume of outflow are not currently being made as stipulated, thus the permit is in violation of Forum policy. It is not know if the permit is in excess of the <1.00 tons/day requirement. |
| (M-4A) Therefore, it is not known whether or not this municipal user is in compliance. | (I-5) This permit is in violation of Forum policy in that they are discharging >1.00 tons/day of salts. |
| (M-4B) However, since outflow concentration is less than 500 mg/l it is presumed that this permit is not in violation of the <400 mg/l increase. | (I-5A) No provision has been made allowing this violation of Forum policy. |
| (M-5) This permit is in violation of Forum policy in that there is an increase in concentration by >400 mg/l over the source waters. | (I-5B) Though discharge is >1.00 tons/day, in keeping with Forum policy the discharger has demonstrated the salt reduction is not practicable and the requirement has been waived. |
| (M-5A) The state is currently working to bring them into compliance. | (I-5C) This permit uses waters for their thermal energy. Only heat is extracted and thus the salt and water which are discharged into the river would have done so naturally. They are covered by the Forums policy on intercepted groundwaters. |
| (M-6) This permit is under the supervision of EPA and they report <400 ppm incremental increase in TDS. | (I-5D) This permit is for a fish hatchery and although they are discharging >1.00 tons/day, the use of the water is a one-time pass through use and not >1.00 tons/day of salt is added by the use. |
| (M-7) Insufficient data to know the status of this permit. | (I-5E) This permit is for the interception and passage of ground waters and thus is excepted under the Forum's policy on ground-water interception. |
| * | (I-6) This permit is under the supervision of EPA and they report a discharge of <1.00 tons/day of salt. |
| Permit issued to a federal agency or an Indian tribe and the responsibility of EPA. | (I-7) Insufficient data to know the current status of this permit. |

NPDES PERMITS
COLORADO RIVER BASIN SALINITY CONTROL FORUM
APRIL, 1990

NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
AZ0000078	930	AZ PUBLIC SERVICE CO YUCCA POWER	0	0.000	0.00	I-2
AZ0110124	801	BIA DENNE HOTSO BOARDING SCHOOL	0	0.000	0.00	M-1*
AZ0110159	900	BIA DILCON SCHOOL	0	0.000	0.00	M-2*
AZ0110167	900	BIA HUNTERS POINT SCHOOL	---	0.014	0.00	M-6*
AZ0110213	900	BIA LOW MOUNTAIN SCHOOL	---	0.014	0.00	M-6*
AZ0110507	801	BIA LUKACHUKAI	0	0.000	0.00	M-1*
AZ0110043	801	BIA NAZLINI BOARDING SCHOOL	---	0.013	0.00	M-5*
AZ0110175	900	BIA PINE SPRINGS SCHOOL	0	0.045	0.00	M-2*
AZ0110132	900	BIA ROCKY RIDGE	0	0.000	0.00	M-1*
AZ0110183	900	BIA SEBA DALKAI	0	0.000	0.00	M-2*
AZ0110094	801	BIA TEEC NOS POS SCHOOL	---	0.080	0.00	M-6*
AZ0110191	900	BIA TOYEI SCHOOL	0	0.000	0.00	M-2*
AZ0110116	700	BIA UPPER KAIBITO	0	0.000	0.00	M-1*
AZ0021610	900	CAMERON TRADING POST	2500	0.010	0.10	I
AZ0021822	801	CHINLE PUBLIC SCHOOL	0	0.000	0.00	M-1*
AZ0021024	920	CITIZENS UTILITIES	1366	0.118	0.67	M-4A
AZ0021415	940	COLORADO RIVER WTJV	360	0.454	0.68	M-4A
AZ0022462	940	COLORADO RIVER INDIAN TRIBE WTP	---	---	0.00	M-7*
AZ0022268	930	CYPRUS BAGDAD COPPER DIV	0	0.000	0.00	I-2
AZ0022144	900	ENERGY FUELS NUCLEAR HACK CANYON	0	0.000	0.00	I-2
AZ0022322	900	ENERGY FUELS NUCLEAR KANAB	0	0.000	0.00	I-2
AZ0022454	900	FAIRFIELD SUNRISE VILLAGE	0	0.000	0.00	I-2
AZ0020427	900	FLAGSTAFF, CITY OF	344	4.662	6.69	M-4B
AZ0022152	900	GRAND CANYON NAT. PK.	---	---	0.00	I-7
AZ0022527	940	HEADGATE ROCK DAM	---	---	0.00	I-7*
AZ0020257	900	HOLBROOK, TOWN OF	835	0.367	1.28	M-4A
AZ0022098	940	LE PERA SCHOOL - PARKER SCHOOL DIST #27	30	0.028	0.00	M-4A
AZ0020265	801	NTUA CHINLE	617	0.168	0.43	M-4A
AZ0020281	801	NTUA KAYENTA	887	0.090	0.33	M-4A
AZ0021920	801	NTUA MANY FARMS	552	0.047	0.11	M-4A
AZ0020290	900	NTUA TUBA CITY	359	0.200	0.30	M-4B
AZ0021555	900	NTUA WINDOW ROCK	730	0.888	2.71	M-4A
AZ0022284	940	PARKER, TOWN OF	---	---	0.00	M-7
AZ0022179	900	PEABODY COAL CO.	0	0.000	0.00	I-2
AZ0020125	900	SNOWFLAKE, TOWN OF	---	---	0.00	M-7
AZ0000132	920	U.S.F.W. WILLOW	36	8.400	1.26	I-5A
AZ0110302	900	US FOREST SERVICE APPACHE	0	0.000	0.00	I-2
AZ0110426	900	US NAT'L PARK SER. GRAND CANYON	460	0.080	0.15	I
AZ0110249	920	WATER & POWER RES SERV DAVIS	710	0.027	0.08	I
AZ0020648	940	WHITEWING AGRICULTURE	---	---	0.00	I-7
AZ0020346	900	WILLIAMS, CITY OF	---	0.141	0.00	M-3
AZ0021512	900	WINSLOW, CITY OF	0	0.000	0.00	M-2
CA0104205	920	NEEDLES, CITY OF	1231	0.960	4.93	M

NPDES PERMITS
COLORADO RIVER BASIN SALINITY CONTROL FORUM
APRIL, 1990

NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
CO0000078	300	WESTERN REFINING	0	0.000	0.00	I-2
COG500141	100	ALPINE ROCK CO.	0	0.000	0.00	I-5E
CO0036609		AMERICAN SHIELD COAL MINE	0	0.000	0.00	I-2
CO0039993	801	AMERIGAS, INC.. CO ₂ DIVISION	1400	0.016	0.09	I
CO0040444	220	AMOCO PRODUCTION-HOTCHKISS RCH	3112	0.007	0.09	I
CO0039683	510	ANDRIKOPOULOS, A G	4600	0.021	0.40	I
CO0033090	801	ANIMAS AGGREGATES INC	0	0.000	0.00	I-1
CO0037320	220	ANTELOPE HILLS HOA	—	—	0.00	M-1
CO0031364	100	ASPEN BASALT KOA CAMPGROUND	361	0.011	0.02	M-1
CO0026387	100	ASPEN CONSOLIDATED SAN DIST	670	1.700	4.75	M
CO0022721	100	ASPEN VILLAGE	250	0.020	0.02	M
CO0040665	190	ATLAS PRECIOUS METALS, INC-CART	0	0.000	0.00	I-1
CO0037117	—	AXIAL BASIN RANCH COMPANY	—	—	0.00	I-1
CO0021491	100	BASALT SANITATION DISTRICT.	320	0.240	0.32	M
CO0039063	100	BATTLEMENT MESA, INC.	890	0.160	0.59	M
CO0038989	100	BATTLEMENT MESA, INC WTP	0	0.000	0.00	I-2
CO0039276	801	BAYFIELD SAN DIST-GEM VILLAGE	420	0.014	0.02	M
CO0020273	801	BAYFIELD SANITARY DIST	220	0.100	0.09	M
CO0036943	220	BEAR COAL COMPANY INC BEAR MIN	0	0.000	0.00	I-1
CO0031003	500	BEAR POLE RANCH	86	0.005	0.00	M
CO0000051	—	BHP PETROLEUM	1790	1.000	7.47	I-5B
CO0033553	220	BLUE RIBBON MINE	1800	0.002	0.02	I
CO0038253	100	BLUE RIVER WTR DIST-PEAK 7 WTP	120	0.003	0.00	I
COG500150	300	BOUNDS & SONS, INC.-BOUNDS PIT	0	0.000	0.00	I-2
CO0036072	100	BRAMWELL-WENDALL	—	—	0.00	M-2
CO0031887	100	BRECKENRIDGE S.D. - QUANDRY	0	0.000	0.00	M-2
CO0029611	100	BRECKENRIDGE S.D. - SKIERS EDGE	0	0.000	0.00	M-2
CO0027197	100	BRECKENRIDGE S.D. - VALLEY OF BLUE	0	0.000	0.00	M-2
CO0021539	100	BRECKENRIDGE SANITATION DISTRICT	260	1.500	1.63	M
CO0031020	100	BRECKENRIDGE WTP	0	0.000	0.00	I-2
CO0041637	801	BUFFALO BOY MINE DEV.	495	0.072	0.15	I-1
COG500096	801	BURNETT CONSTRUCTION COMPANY	0	0.000	0.00	I-2
CO0026751	100	CARBONDALE SANITATION DISTRICT	357	0.343	0.51	M
CO0033634	100	CARBONDALE-TOWN OF	0	0.040	0.00	I-2
CO0039691	801	CASCADE VILLAGE	900	0.027	0.10	M-5
CO0040592	220	CASIAS-LOVATO SUBDIVISION	1070	0.050	0.22	M-1
CO0033961	510	CATHEDRAL BLUFFS SHALE OIL CO	1500	0.410	2.57	I-5B
CO0031984	220	CEDAREDDGE. TOWN OF	370	0.070	0.11	M
CO0039381	220	CEDAREDDGE. TOWN OF - WTP	190	0.005	0.00	I
CO0026981	220	CHIPETA MINING CORP	896	1.330	4.97	I-5A
CO0038474	300	CLEARCREEK DEVELOPMENT SEMI-WORKS	—	—	0.00	I-1
CO0033260	300	CLIFTON SANITATION DISTRICT #1	1456	0.013	0.08	M
CO0033791	300	CLIFTON SANITATION DISTRICT #2	846	0.073	0.26	M
CO0000248	100	CLIMAX INC.-CLIMAX MOLYBDENUM	0	0.000	0.00	I-3
CO0032522	—	CLIMAX INC.-HENDERSON	0	0.000	0.00	M-2
CO0035394	190	CLIMAX-MT. EMMONS	1670	0.143	1.00	I-5B
CO0041076	—	COCA COLA BOTTLING COMPANY	477	0.001	0.00	I
CO0040487	100	COLLBRAN. TOWN OF WWTP	845	0.078	0.28	M
CO0021563	300	COLLBRAN- TOWN OF	0	0.000	0.00	M-1
COG070039	100	COLO DIV HWY-DEBEQUE	0	0.000	0.00	M-2
CO0000329	100	COLO DIV WILDLIFE - CRYSTAL RIVER	349	4.810	7.01	I-5D

NPDES PERMITS
COLORADO RIVER BASIN SALINITY CONTROL FORUM
APRIL, 1990

NPDES #	REACH	NAME	CONCENTRATION	FLOW RATE	SALT LOAD	EXPLANATION
			MG/L	MGD	TONS/DAY	CODE
CO0000353	100	COLO DIV WILDLIFE - FINGER ROCK	225	2.900	2.72	I-5D
CO0000272	190	COLO DIV WILDLIFE - PITKIN TROUT	115	7.200	3.46	I-5D
CO0026352	100	COLO DIV WILDLIFE - RIFLE FALLS	364	23.000	34.94	I-5D
CO0000299	190	COLO DIV WILDLIFE - ROARING JUDY	178	20.300	15.08	I-5D
CO0000281	801	COLO DIV WILDLIFE - DURANGO FISH HATCHERY	231	3.100	2.99	I-5D
CO0030872	100	COLO DIV HWY-WILMOR LAKE REST	670	0.001	0.00	M
CO0040771	100	COLO STATE-DEPT CORR-RIFLE CTR	0	0.000	0.00	M-2
CO0000043	220	COLO UTE ELEC ASSOC - JIM BULLOCK	0	0.000	0.00	I-2
CO0000523	500	COLO UTE ELEC ASSOC - HAYDEN PL	376	0.030	0.05	I
CO0000540	310	COLO UTE ELEC ASSOC - NUCLA STATION	778	0.054	0.18	I
CO0033685	220	COLO WESTMORELAND INC - IRISH FA	0	0.000	0.00	I-2
CO0400002	500	COLO-WYO COAL CO	0	0.000	0.00	I-2
CO0027154	500	COLORADO YAMPA COAL COMPANY	1886	2.360	18.57	I-5B
CO0036021	500	COLORADO YAMPA COAL COMPANY	720	1.922	5.77	I-5A
CO0033537	300	COORS PORCELAIN CO GRAND JUNCTION	234	0.025	0.02	I
CO0021598	100	COPPER MOUNTAIN SANITATION DISTRICT	—	0.182	0.00	M-3
CO0032344	100	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-1
CO0039209	100	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-1
CO0039411	300	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-1
CO0039420	300	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-1
CO0039471	300	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-1
COG500003	300	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-2
COG500155	300	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-2
COG500156	300	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-2
COG500157	300	CORN CONSTRUCTION COMPANY	4260	0.110	1.96	I-1
COG500158	300	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-2
COG500159	300	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-2
COG500160	300	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-1
COG500161	300	CORN CONSTRUCTION COMPANY	0	0.000	0.00	I-2
CO0020125	801	CORTEZ SANITATION DISTRICT - NORTH	1130	0.196	0.92	M-5A
CO0027880	801	CORTEZ SANITATION DISTRICT - SOUTH	660	0.390	1.07	M-5A
CO0027545	801	CORTEZ SANITATION DISTRICT - SOUTHWEST	785	0.128	0.42	M-5A
CO0036251	310	COTTER CORP - J D-9 MINE	2113	0.014	0.12	I
CO0035777	100	COTTONWOOD SPRINGS	2870	0.011	0.13	M
CO0023663	—	COUNTRY MEADOWN MOBILE ESTATES	206	0.011	0.01	M-4B
CO0040037	500	CRAIG, CITY OF WWTP	748	0.691	2.16	M-5A
COG500120	500	CRAIG CONTRACTING	0	0.000	0.00	I-2
CO0037729	220	CRAWFORD SEWER TREATMENT PLANT	370	0.029	0.04	M
CO0027171	190	CRESTED BUTTE WATER & SANITATION DISTRICT	257	0.221	0.24	M
CO0031836	190	CRESTED BUTTE SOUTH METRO DISTRICT	378	0.020	0.03	M
CO0020443	190	CRESTED BUTTE, TOWN OF	152	0.372	0.24	M
CO0038563	801	CUMBERLAND MINES LTD	0	0.000	0.00	I-1
CO0034142	500	CYPRUS EMPIRE ENERGY CORP WISE HILL	943	0.335	1.32	I-5A
CO0023418	100	DEBEQUE, TOWN OF	1106	0.020	0.09	M-5A
CO0032735	220	DELTA -MONTROSE VOCATIONAL-TECH	0	0.000	0.00	M-2
CO0020036	220	DELTA, CITY OF	0	0.000	0.00	M-1
CO0039641	220	DELTA, CITY OF	1854	1.210	9.36	M
COG050136	220	DELTA SAND & GRAVEL CO - PIT N	1219	1.500	7.63	I-5E
CO0000418	100	DILLION, CITY OF	55	0.020	0.00	I
CO0039802	310	DOLORES CANYON MINES	0	0.000	0.00	I-1
CO0020001	801	DOLORES, TOWN OF	0	0.000	0.00	M-1

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NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
CO0040509	801	DOLORES. TOWN OF	439	0.3930	0.72	M-4B
CO0036960	300	DORCHESTER COAL COMPANY	0	0.000	0.00	I-1
CO0033901	190	DOS RIOS DIV OF GUNNISON COUNTY	0	0.000	0.00	I-1
CO0023434	310	DOVE CREEK SANITATION DISTRICT	1547	0.042	0.27	M-5A
CO0024082	801	DURANGO, CITY OF	420	1.466	2.57	M
CO0041181	_____	DURANGO SCHOOL DISTRICT 9R	0	0.000	0.00	I-2
CO0031658	801	DURANGO SKI CORP	0	0.000	0.00	M-1
CO0036226	801	DURANGO WEST METROPOLITAN DIST	1107	0.055	0.25	M
CO0021059	100	EAGLE SANITATION DISTRICT	667	0.056	0.16	M
CO0039501	100	EAGLE, TOWN OF	0	0.000	0.00	I-2
CO0040720	190	EAST RIVER REGIONAL SD-WWTP	207	0.012	0.01	M
CO0040005	100	EASTSIDE COAL CO., INC	0	0.000	0.00	I-2
CO0040266	801	EDGEMONT RANCH WW RECLAM FAC	0	0.000	0.00	M-2
CO0041220	_____	EL ROCKO MOBILE HOME PARK	0	0.000	0.00	M-2
COG500136	220	ELAM CONSTRUCTION	0	0.000	0.00	I-2
COG500106	300	ELAM CONSTRUCTION - 19 ROAD PIT	0	0.000	0.00	I-2
COG500107	300	ELAM CONSTRUCTION - 29 ROAD	0	0.000	0.00	I-2
COG500108	300	ELAM CONSTRUCTION - BOUNDS	0	0.000	0.00	I-2
COG500130	300	ELAM CONSTRUCTION - GRIFFIN PIT	0	0.000	0.00	I-2
CO0033812	300	ELAM CONSTRUCTION - PETERSON	0	0.000	0.00	I-1
CO0039021	500	EMPIRE ENERGY CORP LOADOUT	0	0.000	0.00	I-1
CO0036048	500	ENERGY FUELS COAL, INC	0	0.000	0.00	I-2
CO0850002	510	ENRON COAL COMPANY	0	0.000	0.00	I-2
CO0850003	510	ENRON COAL COMPANY	0	0.000	0.00	I-2
CO0038229	100	EVERIST L G - LOVE GRAVEL PIT	5	1.000	0.02	I
CO0037524	510	EXXON COAL RESOURCES USA, INC	0	0.000	0.00	I-1
CO0038270	100	EXXON COMPANY - COLONY SHALE OIL PRO	0	0.000	0.00	I-2
CO0034193	300	FIBREBOARD CORPORATION	2834	0.044	0.52	I
CO0040240	_____	FIDELITY TRUST BUILDING	_____	0.049	0.00	I-2
CO0040967	190	FILOHA MEADOWS HEALTH EDUCATION	2755	0.053	0.61	I-2
CO0031445	801	FIVE BRANCHES CAMPGROUND	371	0.010	0.02	M
CO0031496	801	FLORIDA MESA ELEMENTARY SCHOOL	0	0.000	0.00	M-1
CO0028827	801	FOREST GROVES ESTATES	473	0.001	0.00	M
CO0020966	100	FRASER SANITARY DISTRICT	0	0.000	0.00	M-1
CO0040142	100	FRASER SANITATION DISTRICT	199	0.247	0.21	M
COG500114	100	FREI, ALBERT & SONS, SILT PIT	0	0.000	0.00	I-2
CO0020451	100	FRISCO SANITARY DISTRICT	447	0.580	1.08	M
CO0037907	100	FRISCO, TOWN OF WTP	0	0.000	0.00	M-2
CO0020257	100	FRUITA, TOWN OF	868	0.326	1.18	M-5
CO0040916	100	GARFIELD COAL SALES, INC	0	0.000	0.00	I-1
CO0070014	_____	GARFIELD COUNTY UNA BRIDGE	0	0.000	0.00	I-1
CO0037460	220	GAYNO INC - MOUNTAIN TOP MINE	53	0.380	0.08	I
CO0036340	500	GENERAL ELECTRIC HOLDING - CRAIG MINE	0	0.000	0.00	I-1
CO0000141	100	GLENWOOD HOT SPRINGS LODGE	14867	3.230	200.39	I-5C
CO0020516	100	GLENWOOD SPRINGS, CITY OF	482	0.784	1.58	M
CO0035386	100	GLENWOOD SPRINGS, CITY OF	149	0.030	0.02	I
CO0380164	100	GOLD FIELD MINING CORP	0	0.000	0.00	I-1
CO0023108	801	GOLDEN WEST PARK	0	0.000	0.00	M-1
CO0035939	801	GOLF HOST WEST	_____	_____	0.00	M-3
CO0020699	100	GRANBY SANITATION DISTRICT	296	0.363	0.45	M
CO0032964	100	GRAND CO WATER & SANITATION DIST	161	0.550	0.37	M

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NPDES #	REACH	NAME	CONCENTRATION	FLOW RATE	SALT LOAD	EXPLANATION
			MG/L	MGD	TONS/DAY	CODE
C00033740	100	GRAND CO WATER & SANITATION DIST	-----	0.020	0.00	I-3
C00040053	300	GRAND JUNCTION, CITY OF - PERSIGO	1073	6.767	30.30	M-5A
C00039462	300	GRAND JUNCTION CONCRETE PIPE	0	0.000	0.00	I-1
C00027715	220	GRAND JUNCTION WATER TP	0	0.000	0.00	I-2
C00036935	220	GRAND MESA COAL COMPANY	0	0.000	0.00	I-1
C00037991	100	GRAND VALLEY PIT, GRAND RIVER CONSTRUCTION	0	0.000	0.00	I-1
C00031640	801	GRANDVIEW MOTEL & PINON ACRES	0	0.000	0.00	M-1
C00033502	-----	GRANITE CONSTRUCTION COMPANY	0	0.000	0.00	I-1
C00036781	801	GREAT GUENNEL GOLD MINING CO L	0	0.000	0.00	I-2
C00041530	220	GUNNISON, CITY OF	333	1.560	2.17	M
C00030996	100	GYPSUM SANITATION	650	0.014	0.04	M-5A
C00020486	500	HAYDEN, TOWN OF	0	0.000	0.00	M-1
C00040959	500	HAYDEN, TOWN OF	47	0.211	0.04	M
C00040452	801	HERMOSA SEWAGE LAGOONS	631	0.070	0.18	M-5
C00036447	500	H-G COAL CO - HAYDEN GULCH MINE	0	0.050	0.00	I-1
C00038164	500	H-G COAL CO - HAYDEN GULCH MINE	444	0.003	0.01	I
C00021326	801	HI-Z MINING CORP	0	0.000	0.00	I-1
C00036315	300	HOLLY PLAZA DEVELOPMENT	416	0.009	0.02	M
C00032841	220	HORIZONS NURSING HOME INC	526	0.010	0.02	M
C00024350	100	HOT SULPHUR SPRINGS, TOWN OF	288	0.045	0.05	M
C00021415	220	HOTCHKISS SANITARY DISTRICT	1473	0.44	2.70	M
C00034363	300	ICS INCORPORATED	0	0.000	0.00	M-2
C00026956	310	IDARADO MINING	0	0.000	0.00	I-1
C00022853	801	IGNACIO SANITARY DISTRICT	304	0.217	0.28	M-4B
C00040754	510	IRI NANCOLITE 3-HOLE EXPLOR PG	0	0.000	0.00	I-2
C00022748	801	JUNCTION CREEK TRAILER PARK	0	0.000	0.00	M-1
C00000132	220	KAISER COAL - SOMERSET MINE	0	0.000	0.00	I-2
C00036081	801	KAISER STEEL RES.	0	0.000	0.00	I-2
C00037214	-----	KAISER STEEL - CHIMNEY ROCK	0	0.000	0.00	I-2
COG500067	101	KENT, F J CORPORATION - GRAVEL	0	0.000	0.00	I-1
C00023876	100	KEYSTONE ARAPAHOE LTD. PARTNER	388	0.010	0.02	M
C00027995	100	KEYSTONE INTERNATIONAL - SUMMIT HOUSE	0	0.000	0.00	M
COG500118	300	KIEWIT WESTERN CO	0	0.000	0.00	I-2
C00021636	100	KREMLING SANITATION DISTRICT	0	0.000	0.00	M-2
C00020371	200	LAKE CITY AREA WATER & SANITATION DISTRICT	0	0.160	0.00	M-1
C00040673	200	LAKE CITY AREA WATER & SANITATION DISTRICT	166	0.152	0.11	M
C00029777	310	LAST DOLLAR PLANNED UNIT	396	0.002	0.00	M
COG500083	-----	LATHAM, THOMAS & GINGER	0	0.000	0.00	I-2
C00040134	100	LAZIER - SILLS JT VT - CANYON CREEK	0	0.000	0.00	M-2
C00020303	100	LAZY GLEN INC	284	0.027	0.03	M
C00032492	801	LEE MOBILE HOME PARK	323	0.004	0.01	M
C00026468	801	LIGHTNER CREEK SAFARI CAMP	700	0.002	0.01	M
C00029904	801	LIGHTNER CREEK MOBILE HOME PARK	0	0.000	0.00	M-2
C00041395	-----	LOBATO, FIDEL - BLUE FLAME COAL	-----	-----	0.00	I-7
C00041408	-----	LOMA LINDA SANITATION DISTRICT	-----	-----	0.00	M-7
C00021687	801	MANCOS, TOWN OF	487	0.120	0.24	M
C00033073	-----	MARQUETTE MINERALS, INC	0	0.000	0.00	I-1
C00022781	510	MEEKER SANITATION DISTRICT	596	0.177	0.44	M
C00029203	190	MERIDIAN LAKE, INC.	146	0.004	0.00	M
COG500071	300	MESA CO ROAD DEPARTMENT	0	0.000	0.00	I-1
C00027456	510	MESA CO - GATEWAY SCHOOL	0	0.000	0.00	M-2
C00032727	300	MESA WATER & SANITATION DISTRICT	641	0.017	0.05	M

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CO0039136	100	MID CONTINENT RESOURCES, INC	0	0.000	0.00	I-2
CO0000396	100	MID CONTINENT RESOURCES, INC BA	0	0.000	0.00	I-2
CO0040495	100	MID-VALLEY METROPOLITAN DISTRICT	432	0.023	0.04	M
COG500079	100	MIDDLE PARK CONCRETE, CERTIFIED REDI-MIX	0	0.000	0.00	I-1
CO0000035	100	MILLER ENTERPRISES - EAGLE MINE	0	0.000	0.00	I-1
CO0039705	500	MILNER SEWAGE TREATMENT FACILITY	374	0.006	0.01	M
CO0033723	300	MOBILE CITY MHP	393	0.003	0.00	M
CO0038860	100	MOBILE HOME MANAGEMENT	1065	0.022	0.10	M-5A
COG500119	100	MOBILE PREMIX COMPANY - RIFLE PIT	0	0.000	0.00	I-2
COG500087	300	MOBILE PREMIX COMPANY - LOESCH PIT	0	0.000	0.00	I-2
CO0037621	500	MOFFAT COUNTY IMPROV - MAYBELL	583	0.011	0.03	M
CO0039624	220	MONTROSE, CITY OF STP	907	1.223	4.63	M-5
CO0000124	220	MONTROSE CONCRETE COMPANY	0	0.000	0.00	I-1
CO0029301	300	MONUMENT MEADOWS PROPERTY OWNER ASSOC.	0	0.000	0.00	M-1
CO0022969	220	MORRISON CREEK METROPOLITAN WA	427	0.047	0.08	M
CO0027472	310	MOUNTAIN VILLAGE METRO DISTRICT	183	0.002	0.00	M
CO0040703	500	MT WERNER WATER & SANITATION-FISH CREEK	0	0.000	0.00	I-2
CO0031551	801	NARROW GAUGE MOBILE HOME PARK	0	0.000	0.00	M-2
CO0040410	510	NATEC MINES, LTD. INC (IRI)	0	0.000	0.00	I-2
CO0850001	801	NATIONAL KING COAL INC - KING CO	0	0.000	0.00	I-2
CO0024007	310	NATURITA, TOWN OF	709	0.021	0.06	M
CO0040894	100	NEW CASTLE ENERGY CORPORATION	0	0.000	0.00	I-2
CO0020192	100	NEW CASTLE, TOWN OF	0	0.000	0.00	M-1
CO0040479	100	NEW CASTLE, TOWN OF WWTP	428	0.090	0.16	M
COG500089	100	NICHOLS BEN J - CALDWELL PIT	0	0.000	0.00	I-1
CO0038601	100	NIELSON INC - ORTIZ GRAVEL	0	0.000	0.00	I-1
CO0037168	190	NORTH ELK MEADOWS WWTP	392	0.001	0.00	M
CO0034096	220	NORTH FORK CONCRETE PRODUCTS	0	0.000	0.00	I-1
CO0031895	510	NORTH PARK MOBILE HOME PARK	0	0.000	0.00	M-1
CO0037354	510	NORTHERN COAL COMPANY	0	0.000	0.00	I-1
CO0037931	510	NORTHERN COAL COMPANY - NORTHERN	0	0.000	0.00	I-1
CO0039667	510	NORTHWEST PIPELINE CORPORATION	0	0.000	0.00	I-1
CO0032191	310	NORWOOD SANITATION DISTRICT	624	0.049	0.13	M
CO0020591	310	NUCLA SANITARY DISTRICT	1636	0.120	0.82	M-5
CO0037605	___	O C COAL MINE	0	0.000	0.00	I-2
CO0021393	500	OAK CREEK, TOWN OF	0	0.000	0.00	M-1
CO0040908	500	OAK CREEK, TOWN OF WIP	133	0.056	0.03	I
CO0039322	220	OAK GROVE ELEMENTARY SCHOOL	0	0.000	0.00	M-1
CO0029947	100	OCCIDENTAL OIL SHALE - LOGAN WASH	0	0.000	0.00	I-2
CO0020907	220	OLATHE, CITY OF	2246	0.190	1.78	M-5A
CO0028860	100	OURAY RANCH ASSOC. LTD.	0	0.000	0.00	M-2
CO0020087	220	OURAY SANITARY DIST	603	0.350	0.88	M
CO0033014	220	OWNERS ASSOC. ELK MEADOWS ESTATES	0	0.000	0.00	M-1
CO0036790	801	P & G MINING COMPANY, INC	0	0.000	0.00	I-1
CO0039586	801	P & G MINING COMPANY, INC.	535	0.425	0.95	I-1
CO0031755	801	PAGOSA AREA WATER & SANITATION DIST	700	0.474	1.38	M
CO0038032	801	PAGOSA AREA WATER & SANITATION DIST	1150	0.027	0.13	M-5A
CO0041343	___	PAGOSA AREA WATER & SANITATION DIST	___	0.010	0.00	I-7
CO0039659	801	PAGOSA PROPANE / TOVREA OIL	0	0.000	0.00	M-1
CO0022845	801	PAGOSA SPRINGS SAN DISTRICT	770	0.337	1.08	M-5A
CO0039764	300	PALISADE, TOWN OF - SEWAGE LAGOON	439	0.168	0.31	M

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NPDES #	REACH	NAME	CONCENTRATION	FLOW RATE	SALT LOAD	EXPLANATION
			MG/L	MGD	TONS/DAY	CODE
CO0040100	300	PALISADE, TOWN OF WTP	0	0.000	0.00	I-2
CO0037583	801	PANDORO MINING COMPANY - ANGLO	0	0.000	0.00	I-1
CO0022713	300	PANORAMA IMPROVEMENT DISTRICT	408	0.063	0.11	M
CO0021709	220	PAONIA, TOWN OF	1453	0.264	1.60	M-4A
CO0037656	500	PEABODY COAL CO - MESA GRAVEL	429	0.006	0.01	I
CO0000213	310	PEABODY COAL CO - NUCLA MINE	2508	0.163	1.71	I-5A
CO0000221	500	PEABODY COAL CO - SENECA MINE	1933	0.092	0.74	I
COG070069	500	PEABODY COAL CO - SENECA II MINE	0	0.000	0.00	I-2
CO0041033	---	PEERLESS RESOURCES, INC	0	0.000	0.00	I-2
CO0032638	500	PITTSBURG & MIDWAY COAL MINE	0	0.000	0.00	I-2
CO0027537	801	PONDEROSA KOA	729	0.016	0.05	M
CO0027146	300	POWDERHORN COAL COMPANY	0	0.000	0.00	I-2
CO0036617	300	POWDERHORN COAL COMPANY	0	0.000	0.00	I-1
CO0023485	300	POWDERHORN METRO	132	0.210	0.12	M
CO0000027	300	PUBLIC SERVICE COMPANY - CAMEO STATION	194	48.430	39.21	I-5B
CO0038610	801	PUEBLO COAL	0	0.000	0.00	I-2
CO0040878	801	PURGATORY METRO DISTRICT WWTP	0	0.000	0.00	M-1
CO0020176	801	PURGATORY SANITARY DISTRICT	904	0.048	0.18	M
CO0035807	220	QUINN COAL COMPANY	0	0.000	0.00	I-2
CO0028525	100	RANCH AT ROARING FORK	688	0.034	0.10	M
CO0036366	801	RANCH WWTP	---	0.014	0.00	M-3
CO0026972	510	RANGELY SANITATION DISTRICT	404	0.223	0.38	M
CO0000108	310	RAPHOLZ SILVER, INC - SILVER BELL	0	0.000	0.00	I-2
CO0021385	100	REDCLIFF SANITARY DISTRICT	---	0.280	0.00	M-3
CO0039551	100	REDSTONE 21-9 GEOTHERMAL WELL	0	0.000	0.00	I-2
CO0041564	---	REDSTONE CORPORTATION	0	0.000	0.00	M-1
CO0023922	100	REDSTONE WATER & SANITATION DISTRICT	383	0.036	0.06	M
CO0031402	801	RICKHOFF, LEO	0	0.000	0.00	M-2
CO0029793	310	RICO DEVELOPMENT CORPORATION	1020	1.400	5.96	I-5A
CO0029106	220	RIDGWAY, TOWN OF	758	0.010	0.03	M
CO0020117	100	RIFLE, CITY OF	0	0.000	0.00	M-1
CO0030970	100	RIFLE, CITY OF	757	0.063	0.20	M
CO0040738	100	RIFLE, CITY OF WWTP	1229	0.500	2.56	M-5A
CO0034045	510	RIO BLANCO OIL SHALE PROJECT	0	0.000	0.00	I-1
CO0035947	190	RIVER BEND WASTEWATER TREATMENT	0	0.000	0.00	M-1
CO0035653	500	ROCKCASTLE CO - GRASSY CREEK COAL MINE	0	0.000	0.00	I-2
CO0032590	500	ROUTT CO. FOR PHIPPSBURG COMMUNITY	466	0.027	0.05	M
CO0036277	801	SACKETT MINING CO SHALAKO MINE	0	0.000	0.00	I-1
CO0038342	100	SALT CREEK MINING COMPANY	0	0.000	0.00	I-2
CO0040827	---	SALT CREEK MINING COMPANY	0	0.000	0.00	I-2
CO0031461	801	SAN JUAN RIVER RESORT INC	232	0.017	0.02	M
CO0032573	801	SAN JUAN AREA VOC-TECH SCHOOL	0	0.000	0.00	M-1
COG500093	220	SCHNEIDERS READY MIX CO	0	0.000	0.00	I-1
CO0040860	310	SECURITY SAVINGS AND LOAN	346	0.003	0.00	M
CO0036978	801	SIERRA VERDE ESTATES	0	0.000	0.00	M-2
CO0029181	100	SILT, TOWN OF	687	0.143	0.41	M
CO0026867	220	SILVER SPRINGS TROUT FARM	585	0.825	2.01	I-5D
CO0020826	100	SILVERTHORNE - DILLON JOINT SW	314	1.055	1.38	M
CO0020311	801	SILVERTON, TOWN OF	315	0.407	0.54	M
CO0038598	100	SKI SUNLIGHT INC	309	0.012	0.02	M
CO0029599	100	SNOWMASS COAL CO - THOMPSON CREEK	---	0.024	0.00	I-4

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NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
C00037567	100	SNOWMASS COAL CO - UNIT TR	0	0.000	0.00	I-1
C00036544	100	SNOWMASS WATER TREATMENT PLANT	0	0.000	0.00	I-2
C00023086	100	SNOWMASS WATER & SANITATION	211	0.690	0.61	M
C00031810	100	SOPRIS VILLAGE JOINT VENTURE	0	0.000	0.00	M-2
C00022632	—	SOUTH BLUE RIVER SANITATION	0	0.000	0.00	M-1
C00041262	—	SOUTH DURANGO SANITATION DISTRICT	485	0.020	0.04	M
C00037001	220	SPRING CREEK ESTATES LAGOON	433	0.003	0.01	M
C00038075	510	STAGECOACH SANITATION INC	0	0.000	0.00	M-2
C00032280	500	STEAMBOAT HEALTH & RECREATION	625	0.072	0.19	I-2
C00035556	500	STEAMBOAT LAKE SANITATION DISTRICT	129	0.026	0.01	M
C00020834	500	STEAMBOAT SPRINGS, TOWN OF	196	1.620	1.33	M
C00029955	100	SUMMIT COUNTY - SNAKE RIVER	350	0.450	0.66	M
C00036030	500	SUN COAL COMPANY INC - MEADOWS N	529	0.013	0.03	I-2
C00036668	500	SUNLAND MINING CORP APEX #2 MI	0	0.000	0.00	I-2
C00027529	801	SUNNYSIDE GOLD - AMERICAN	1953	3.530	28.77	I-5A
C00000426	801	SUNNYSIDE GOLD - MAYFLOWER	404	0.550	0.93	I
C00036056	801	SUNNYSIDE GOLD - TERRY TUNNEL	561	0.006	0.01	I
C00041355	—	SWANS NEST UTILITY COMPANY	0	0.000	0.00	M-2
C00035815	100	TALBOT ENTERPRISES	1533	0.045	0.29	I
C00020869	310	TELLURIDE, TOWN OF	0	0.000	0.00	M-1
C00041840	310	TELLURIDE, TOWN OF	263	0.339	0.37	M
C00039527	310	TELLURIDE, TOWN OF WTP	0	0.000	0.00	I-2
C00039756	220	TERROR CREEK CO - PACIFIC BASIN	0	0.000	0.00	I-2
C00037681	100	THREE LAKES WATER & SANITATION - WILLOW	199	0.272	0.23	M
C00037699	100	THREE LAKES WATER & SANITATION-SUN VALLEY	264	0.003	0.00	M
C00041165	—	THREE RIVERS RESORT, INC	0	0.000	0.00	M-1
C00037672	190	TIMBERLINE MINING INC	0	0.000	0.00	I-1
C00040550	—	TORO DE PLATA, INC	0	0.000	0.00	I-1
C00032115	500	TRAPPER MINING INC	1324	0.396	2.19	I-5A
CO	—	TRW EXPL & PROD - CACTUS VALLEY	945	0.015	0.00	I
C00036684	500	TWENTYMILE COAL CO	3210	0.027	0.36	I
C00041009	801	TXO PRODUCTION CORP	0	0.000	0.00	I-1
C00000515	310	UMETCO MINERALS CORP - URAVAN WWT	0	0.000	0.00	I-1
C00020648	310	UMETCO MINERALS CORP - URAVAN	0	0.000	0.00	M-1
C00039101	220	UNCOMPAGRE VISTA SUBDIV WWT	0	0.000	0.00	M-1
C00039918	100	UNION OIL CO - PARACHUTE CREEK	0	0.000	0.00	I-2
C00038121	100	UNION OIL TEMP CAMP	0	0.000	0.00	M-2
C00037532	220	UNITED BANK OF DELTA	0	0.000	0.00	M-2
COG500047	—	UNITED COMPANIES OF MESA	4865	0.032	0.65	I-5E
COG500004	—	UNITED COMPANIES OF MESA COUNTY	6300	0.032	0.84	I-5E
COG500020	300	UNITED COMPANIES OF MESA COUNTY	0	0.000	0.00	I-1
COG500142	300	UNITED SAND & GRAVEL COMPANY	0	0.000	0.00	I-2
C00024431	100	UPPER EAGLE VALLEY	483	0.260	0.52	M
C00037311	100	UPPER EAGLE VALLEY - SQUAW CREEK	350	1.442	2.11	M
C00021369	100	UPPER EAGLE VALLEY - VAIL	260	2.025	2.20	M
C00037508	310	USBOR - BLUE MESA SPILLWAY	0	0.000	0.00	I-1*
C00027511	300	USBOR - COLLBRAN JOB CORPS	—	0.000	0.00	M-1*
C00021725	100	USBOR - GREEN MTN GOVT CAMP	—	0.000	0.00	M-1*
C00021741	100	USBOR - GREEN MTN POWER PLANT	0	0.001	0.00	M-3*
C00021351	220	USBOR - MORROW POINT DAM	—	0.001	0.00	M-3*
C00034398	801	USDI-NPS-MESA VERDE NAT'L PARK	—	0.028	0.00	M-3*

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NPDES #	REACH	NAME	CONCENTRATION	FLOW RATE	SALT LOAD	EXPLANATION
			MG/L	MGD	TONS/DAY	CODE
C00000086	220	USFWS - HOTCHKISS NFH	—	6.490	0.00	I-3*
C00022578	220	USFWS - HOTCHKISS NFH STP	0	0.000	0.00	M-3*
C00000205	300	UTE WATER CONSERVATION DISTRICT - WA	0	0.000	0.00	I-2
C00030465	100	VAIL ASSOCIATES INC	0	0.000	0.00	M-1
COG500010	190	VALCO INC - GUNNISON CONCRETE	344	1.075	1.54	I-5E
C00031437	801	VALLECITO RESORT	0	0.000	0.00	M-2
C00037702	801	VISTA VERDE VILLAGE	0	0.000	0.00	M-2
C00037206	220	WALKER MINING & MILLING INC	0	0.000	0.00	I-2
C00038776	220	WEST ELK COAL COMPANY (WECC)	591	0.022	0.05	I
C00024317	100	WEST GLENWOOD SPRINGS SANITATION DISTRICT	407	0.185	0.31	M
C00030499	220	WEST MONTROSE SANITATION DISTRICT	871	0.193	0.70	M-5
C00038024	510	WESTERN FUELS UTAH INC - DESERAD	5488	0.189	4.33	I-5
C00033146	220	WESTERN SLOPE CARBON	0	0.000	0.00	I-1
C00031062	500	WHITEMAN SCHOOL	235	0.004	0.00	M
COG500122	220	WHITEWATER BLDG - 29 ROAD	0	0.000	0.00	I-2
COG500123	220	WHITEWATER BLDG - DYKE ROAD	0	0.000	0.00	I-2
COG500127	220	WHITEWATER BLDG - HWY 141	944	3.560	14.02	I-5E
COG500062	—	WILLIAMS FORK COMPANY	2557	0.717	7.65	I-5E
C00026051	100	WINTER PARK WATER & SANITATION	200	0.110	0.09	M
C00035319	801	WOLF CREEK VILLAGE MOBILE HOME	0	0.000	0.00	M-2
C00028762	220	WOODGATE SUBDIVISION	1654	0.008	0.06	M-5
C00030635	500	YAMPA, TOWN OF	254	0.056	0.06	M
C00023442	100	YMCA SNOW MTN RANCH	0	0.000	0.00	M-2
NM0027995	801	ARCO MATERIALS INC.	—	0.085	0.00	I-3
NM0000019	801	ARIZONA PUBLIC SERVICE CO. - FOUR CORNER	1469	6.900	42.30	I-5B
NM0020168	801	AZTEC WASTEWATER TREATMENT PLANT	615	0.410	1.05	M-6
NM0028142	801	BLOOMFIELD SCHOOLS WASTEWATER TREATMENT	—	0.003	0.00	I-7
NM0020770	801	BLOOMFIELD WASTEWATER TREATMENT PLANT	518	0.680	1.47	M-4A
NM0029538	900	CARBON COAL (CARBON #2 MINE)	0	0.000	0.00	I-2
NM0029251	801	CARBON COAL (MENTMORE MINE)	0	0.000	0.00	I-2
NM0029319	801	CENTRAL CONS. SCHOOL DIST #22	619	0.050	0.13	I-6
NM0028584	801	CONSOLIDATION COAL CO.	0	0.000	0.00	I-2
NM0029793	801	DELTA ENVIRONMENTAL CONSULTANTS	0	0.000	0.00	I
NM0029572	801	FARMINGTON MUNICIPAL OPERATIONS CENTER	0	0.000	0.00	I-5E
NM0000043	801	FARMINGTON POWER PLANT (ANIMAS)	0	2.870	0.00	I-6
NM0028258	801	FARMINGTON SAND AND GRAVEL	0	0.000	0.00	I-2
NM0000051	801	FARMINGTON WWTP	0	0.270	0.00	I-3
NM0020583	801	FARMINGTON WWTP	787	3.250	10.67	M-6
NM0020672	900	GALLUP WWTP	—	2.700	0.00	M-7
NM0029025	801	HARPER VALLEY SUBD. (USDIBIA)	—	0.007	0.00	I-7
NM0027774	900	INDIAN HILLS MHP	—	0.005	0.00	M-7, M-3
NM0029505	801	LA PLATA MINE	0	0.000	0.00	I-2
NM0020630	900	NTUA CROWNPOINT WWTP	777	0.089	0.29	M-6*
NM0020613	900	NTUA NAVAJO WWTP	—	0.097	0.00	M-7*
NM0020621	801	NTUA SHIPROCK WWTP	645	0.630	1.70	M-6*
NM0020605	801	NTUA TOHATCHI WWTP	—	—	0.00	M-7*
NM0029408	900	PONDEROSA PRODUCTS, INC.	0	0.000	0.00	I-2
NM0028606	801	PUBLIC SERVICE CO OF NM - SAN JUAN	0	0.000	0.00	I-2
NM0020524	900	QUIVIRA MINING COMPANY - CHURCH ROCK	0	0.000	0.00	I-5B I-2
NM0023396	900	RAMAH WWTP	0	0.290	0.00	M-7

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NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
NM0028746	801	SAN JUAN COAL CO. SAN JUAN MINE	0	0.000	0.00	I-2
NM0000027	801	SAN JUAN CONCRETE COMPANY	—	0.270	0.00	I-3
NM0029432	801	SUNBELT MINING DE-NA-ZIN MINE	0	0.000	0.00	I-2
NM0029475	801	SUNBELT MINING GATEWAY MINE	0	0.000	0.00	I-2
NM0028550	900	UNITED NUCLEAR CORPORATION CHURCH ROCK	0	0.000	0.00	I-2
NM0020401	900	UNITED NUCLEAR CORPORATION NE CHURCH ROCK	0	0.000	0.00	I-2
NM0020869	801	USDIBIA, CRYSTAL BOARDING SCHOOL	0	0.000	0.00	M-7*
NM0021016	801	USDIBIA, LAKE VALLEY BOARDING SCHOOL	0	0.000	0.00	M-7*
NM0020800	801	USDIBIA, NENAHNEZAD BOARDING SCHOOL	—	0.027	0.00	M-7*
NM0020991	801	USDIBIA, PUEBLO PINTADO BOARDING SCHOOL	0	0.000	0.00	M-7*
NM0020982	801	USDIBIA, STANDING ROCK BOARDING SCHOOL	0	0.000	0.00	M-7*
NM0020958	900	USDIBIA, WINGATE BOARDING SCHOOL	0	0.000	0.00	M-1*
NM0028193	801	UTAH INTERNATIONAL INC. - NAVAJO MINE	0	0.000	0.00	I-2
NV0021261	910	CLARK COUNTY SD #1	1300	48.950	265.55	M
NV0000078	910	KERR - MCGEE CHEMICAL	652	0.010	0.03	I
NV0020133	910	LAS VEGAS, CITY OF	952	37.330	148.30	M
NV0020192	910	NV DEPT FISH & GAME	579	3.780	9.13	I-5D
NV0020923	910	STAUFFER CHEMICAL CO	0	0.000	0.00	I-2
NV0000060	910	TITANIUM METALS	589	4.138	10.17	I
UT0021091	610	ALTAMONT, CITY OF	0	0.000	0.00	M-2
UT0000167	510	AMERICAN GILSONITE CO	2000	0.110	0.92	I-5E
UT0024112	600	AMOCO MINERALS CO - SUNNYSIDE TRIAL	0	0.000	0.00	I-1
UTG040008	600	ANDALEX - PINNACLE COAL MINE	2050	0.072	0.62	I
UTG040007	600	ANDALEX WILDCAT LOADOUT	0	0.000	0.00	I-2
UT0024180	610	ASAMERA OIL - HANSEN #1	0	0.000	0.00	I-1
UTG640003	411	ASHLEY VALLEY WATER & SEWER IDWTP	0	0.000	0.00	M-2
UT0020028	411	ASHLEY VALLEY SEWER BOARD	0	0.000	0.00	M-4A
UT0020133	802	ATLANTIC RICHFIELD CO-ENGLISH	1060	0.130	0.58	I
UT0023914	300	ATLAS MINERALS VELVET MINE	520	0.186	0.40	I
UT0023922	300	ATLAS MINERALS RIM MINE	369	0.001	0.00	I
UT0023906	710	ATLAS MINERALS SNOW PROBE MINE	0	0.000	0.00	I-1
UT0023060	600	BEAVER CREEK COAL - GORDON 3 & 6	0	0.000	0.00	I-2
UTG040004	710	BEAVER CREEK COAL - GORDON CREEK	435	0.007	0.01	I
UT0023116	710	BEAVER CREEK COAL - HUNTINGTON	0	0.000	0.00	I-2
UTG040005	600	BEAVER CREEK COAL COMPANY	0	0.000	0.00	I-2
UTG040003	710	BEAVER CREEK - TRAIL MOUNTAIN	0	0.000	0.00	I-2
UTG040002	710	BHP - KNIGHT COAL MINE	0	0.000	0.00	I-1
UT0024139	300	BIG HORN OIL, INC.	0	0.000	0.00	I-1
UT0023086	600	BLACKHAWK COAL	2400	0.015	0.15	I
UTG640019		BLANDING CULINARY WATER TREATMENT	0	0.000	0.00	M-2
UT0023647	600	BLAZON NO 1 MINE	0	0.000	0.00	I-1
UT0020451	510	BONANZA, CITY OF	0	0.000	0.00	M-2
UT0023761	600	C & W MINE # 1	0	0.000	0.00	I-2
UT0023663	710	CASTLE VALLEY SPECIAL SERVICE	1539	0.160	1.03	M-4A
UT0022489	700	CHAPPELL'S CHEESE COMPANY	0	0.000	0.00	I-1
UT0000230	411	CHEVRON RESOURCES COMPANY	0	0.000	0.00	I-2
UT0022411	600	CLEAR CREEK UTILITIES, INC.	0	0.000	0.00	M-2
UTG040006	710	CO-OP MINING COMPANY	0	0.000	0.00	I-2
UT0023540	600	COASTAL STATES ENERGY CO-UTAH	730	0.470	1.43	I-5E

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NPDES #	REACH	NAME	CONCENTRATION	FLOW RATE	SALT LOAD	EXPLANATION
			MG/L	MGD	TONS/DAY	CODE
UT0022616	700	CONSOLIDATED COAL CO-UNDERGROUND	2800	0.076	0.89	I-5E
UT0022624	700	CONSOLIDATED COAL CO. - SURFACE MINE	0	0.000	0.00	I-2
UT0024040	700	CONSOLIDATED COAL - EMERY PLANT	0	0.000	0.00	I-2
UT0020095	610	DUCHESNE CITY CORP	924	0.180	0.69	M-4A
UTG640014		DUTCH, JOHN	0	0.000	0.00	M-2
UTG640012	600	E CARBON CITY - SUNNYSIDE CWWP	0	0.000	0.00	M-2
UT0000124	411	ENERGY RESERVES GP	1329	1.081	6.00	I-5E
UT0000035	411	EQUITY OIL CO	1360	1.400	7.95	I-5E
UT0020052	710	FERRON, CITY OF	1804	0.120	0.90	M-4A
UT0023876	600	FIRST WESTERN COAL CO- ALETHA #1	0	0.000	0.00	I-2
UTG940010	600	GENWAL - (WELLINGTON)	0	0.000	0.00	I-2
UT0024368	710	GENWAL COAL CO, INC-CRANDALL	600	0.000	0.00	I
UT0000787	600	GREEN RIVER, CITY OF	700	0.100	0.29	M
UT0020958	600	GREEN RIVER, CITY OF	0	0.000	0.00	M-1
UT0022748	600	HIAWATHA	0	0.000	0.00	M-2
UT0021792	411	HOLLANDSWORTH & TRAVIS	1940	0.105	0.85	I-5E
UT0021296	710	HUNTINGTON, CITY OF	2827	0.410	4.84	M-4A
UT0024015	411	INTERMOUNTAIN CONCRETE	0	0.000	0.00	I-2
UT0022926	600	KAISER STEEL CORP-UNITED STATES STEEL CORP	0	0.000	0.00	I-2
UT0020401	900	KANAB CITY CORP	0	0.000	0.00	M
UT0021377	600	KENILWORTH UTILITIES CO	0	0.000	0.00	M-2
UT0021768	411	LACY-R INC	1544	0.345	2.22	I-5E
UT0020443	411	MANILA, TOWN OF	3838	0.010	0.16	M-4A
UT0023396	300	MINERALS EVALUATION & INVEST	0	0.000	0.00	I-2
UT0024694	600	MK - FERGUSON CO (GREEN RIVER UMTRA)	0	0.000	0.00	I-2
UT0020419	300	MOAB, CITY OF	461	0.700	1.35	M
UT0023108	300	MOAB READY-MIX CO	0	0.000	0.00	I
UTG640007	300	MOAB SALT WTP	0	0.000	0.00	I-2
UTG640015	802	MONTICELLO CITY (CULINARY WATER TREATMENT)	0	0.000	0.00	M-2
UTG640008		MYTON CITY WTP	0	0.000	0.00	M-2
UT0023001	610	NEOLA TOWN WATER & SEWER ASSOC.	0	0.000	0.00	M-2
UT0024287	610	NORTH FORK SIPHON - SUCCESSFUL BIDDER	0	0.000	0.00	I-1
UT0000094	600	PACIFIC CORP (CARBON)	1900	0.470	3.73	I-5B
UT0023426	710	PACIFIC CORP (HUNTER)	0	0.000	0.00	I
UT0024163	510	PARAHO-UTE OIL SHALE FACILITY	0	0.000	0.00	I-1
UT0022527	610	PENNZOIL	0	0.000	0.00	I-2
UT0023736	600	PLATEAU MINING COMPANY	837	0.100	0.35	I
UT0024341	600	PLEASANT VALLEY COAL - KINNEY #2	0	0.000	0.00	I-1
UT0000183	411	PRECISION ENGINEERING, INC	1996	0.067	0.56	I
UT0021814	600	PRICE RIVER WATER IMP DIST	1873	1.700	13.29	M
UT0024295	710	RILDA CANYON MINE - WEST APPA	0	0.000	0.00	I-1
UT0000311	802	RIO ALGOM CORP - LISBON MINE	0	0.000	0.00	I-1
UT0024228	510	SEEP RIDGE SHALE OIL COMPANY	0	0.000	0.00	I-2
UT0023680	600	SOLDIER CREEK COAL CO	860	0.297	1.07	I-5E
UT0023701	710	SOLDIER CREEK COAL CO HIDDEN VALLEY	0	0.000	0.00	I-2
UT0023817	600	SOLDIER CREEK COAL COMPANY	0	0.000	0.00	I-2
UT0022918	700	SOUTHERN UTAH FUEL	680	0.680	1.93	I-5E
UT0021776	905	ST GEORGE, CITY OF	1238	2.820	14.57	M
UT0024031	600	SUNCO ENERGY DEVELOPMENT CO	0	0.000	0.00	I-2
UT0022942	600	SUNNYSIDE RECLAMATION & SALVAGE	1500	1.200	7.51	I-5E
UT0024759	600	SUNNYSIDE WASTE COAL FACILITY	1300	0.060	0.33	I

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NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
UT0000761	300	TEXASGULF, INCORPORATED, MOAB POTASH OPERAT	0	0.000	0.00	I-2
UT0024104	510	TOSCO DEVELOPMENT CORP - SAND WASH PROJECT	0	0.000	0.00	I-2
UTG640002	610	TRIDWELL - LAPOINT WATER (IDWTP)	0	0.000	0.00	M-2
UT0023370	900	TROPIC TOWN	0	0.000	0.00	M-2
UT0024171	411	TXO PROD CORP - ASPHALT CREEK FED 1	0	0.000	0.00	I-1
UT0023841	610	TYGER CONSTRUCTION CO, INC-UPPER STILLWATER	0	0.000	0.00	I-1
UT0023931	600	UCO, INC - SCOFIELD MINE	0	0.000	0.00	I-1
UT0023990	600	UCO, INCORPORATED	0	0.000	0.00	I-1
UT0023787	411	UNDERGROUND CONSTRUCT CO-TYZACK PUMPING	0	0.000	0.00	I-1
UT0023094	600	UNITED STATES FUEL CO	700	0.800	2.34	I-5E
UTG640006		US NATIONAL PARK (CAPITOL REEF WTP)	0	0.000	0.00	M-2
UTG640004		US NATIONAL PARK (GLEN CANYON WTP)	0	0.000	0.00	M-2
UT0023035	610	USBOR - STILLWATER	0	0.000	0.00	I-1
UT0024252	610	USBOR - SOLDIER CREEK DAM	0	0.000	0.00	I-1
UT0020338	411	USBOR - FLAMING GORGE DAM	800	0.060	0.20	I
UT0021121	411	USBOR - DUTCH JOHN COMMUNITY	0	0.000	0.00	I-2
UT0024023	610	USBOR UPPER STILLWATER DAM/TUN	0	0.000	0.00	I-1
UT0000213	411	USFWS - JONES HOLE NFH	250	21.600	22.53	I-5D
UT0000191	610	UTAH DIV OF WILDLIFE - WHITEROCK	300	5.500	6.89	I-5D
UT0000256	700	UTAH DIV OF WILDLIFE - LOA	200	8.650	7.22	I-5D
UT0022811	700	UTAH DIV OF WILDLIFE - J PERRY EAGON	120	11.600	5.81	I-5D
UT0022896	710	UTAH POWER & LIGHT CO (WILBERG MINE)	2000	0.050	0.42	I
UT0023591	710	UTAH POWER & LIGHT CO (DES BEE DOVE MINE)	0	0.000	0.00	I
UT0023604	710	UTAH POWER & LIGHT CO (DEER CREEK)	0	0.000	0.00	I
UTG040009	710	UTAH POWER & LIGHT CO (HUNTER COAL PREP)	0	0.000	0.00	I-2
UT0022985	600	VALLEY CAMP OF UTAH INC	500	0.180	0.38	I-5E
UTG640005	905	VIRGIN WTP	0	0.000	0.00	M-2
UT0020184	900	WASHINGTON CITY	0	0.000	0.00	M-2
UT0023515	710	WESTERN STATES MINERALS CORP	0	0.000	0.00	I-1
UT0024121	610	WHITE RIVER DAM - SUCCESSFUL BIDDER	0	0.000	0.00	I-2
UT0024261	510	WHITE RIVER SHALE OIL CORP	0	0.000	0.00	I-1
UT0023868	510	ZIEGLER CHEMICAL	2300	0.035	0.34	I-5E
WY0026671	401	AMERICAN FAMILY INN	616	0.010	0.03	M
WY0033448	411	AMOCO SKULL POINT	0	0.000	0.00	I-2
WY0022128	401	B & R INC	704	0.050	0.15	M
WY0022888	500	BAGGS, TOWN OF	750	0.080	0.25	M
WY0020133	500	BIG PINEY, TOWN OF	724	0.500	1.51	M
WY0030261	401	BLACK BUTTE COAL COMPANY	0	0.000	0.00	I-2
WY0028886	401	BLACK BUTTE COAL	0	0.000	0.00	I-2
WY0030350	401	BRIDGER COAL COMPANY	0	0.000	0.00	I-2
WY0033111	411	CHEVRON SLURRY PUMP STATION	832	0.014	0.05	I
WY0032697	411	CHEVRON - CARTER CREEK GAS PLANT	0	0.000	0.00	I-2
WY0031411	500	CHEYENNE, CITY OF - BD PUB UTIL	0	0.000	0.00	I-2
WY0023132	411	CHURCH & DWIGHT CO INC	1500	0.006	0.04	I
WY0032727	401	COLO INTERSTATE GAS CO - IABLE	1240	0.021	0.11	M
WY0023825	401	DANA COAL COMPANY	0	0.000	0.00	I-2
WY0034398	200	DANFORD, DAVID - LUST SITE	0	0.000	0.00	I-2
WY0023124	401	DANIEL'S MOBILE HOME PARK	0	0.000	0.00	M-2
WY0021938	500	DIXON, TOWN OF	750	0.010	0.03	M
WY0023523	500	DOS LOMAS MINING	50	0.500	0.10	I

NPDES PERMITS
COLORADO RIVER BASIN SALINITY CONTROL FORUM
APRIL, 1990

NPDES #	REACH	NAME	CONCENTRATION	FLOW RATE	SALT LOAD	EXPLANATION
			MG/L	MGD	TONS/DAY	CODE
WY0032701	401	EXXON CORP - LABARGE PROJ	0	0.000	0.00	I-2
WY0032689	401	EXXON CORP - LABARGE PROJ	0	0.000	0.00	I-2
WY0032450	401	EXXON	0	0.000	0.00	I-2
WY0027626	401	FMC WYOMING CORPORATION	0	0.000	0.00	I-2
WY0031763	401	FMC	0	0.000	0.00	I-2
WY0022071	411	FORT BRIDGER	588	0.250	0.61	M
WY0022373	411	GRANGER, TOWN OF	0	0.000	0.00	M-2
WY0020443	401	GREEN RIVER, CITY OF	870	0.500	1.82	M
WY0000027	401	GREEN RIVER/ROCK SPRINGS JOINT POWERS BD	0	0.000	0.00	I-2
WY0033553	411	HAGENSTEIN GRAVEL	0	0.000	0.00	I-2
WY0000116	411	KEMMERER, CITY OF WTP	388	0.035	0.06	I
WY0020320	411	KEMMERER, CITY OF	720	1.000	3.00	M
WY0022080	411	LA BARGE, TOWN OF	976	0.080	0.33	M
WY0030473	401	LAKE VIVA NAUGHTON MARINA	900	0.001	0.00	M
WY0020117	411	LYMAN, TOWN OF	686	0.320	0.92	M
WY0021997	401	MARBLETON	700	0.150	0.44	M
WY0030392	500	MERIDIAN OIL COMPANY	0	0.000	0.00	I-2
WY0022896	411	MOUNTAIN VIEW	546	0.150	0.34	M
WY0027359	500	NATURAL GAS PROCESSING COMPANY	0	0.000	0.00	I-2
WY0026841	411	OPAL, TOWN OF	0	0.000	0.00	M
WY0020656	401	PINEDALE, TOWN OF	100	1.000	0.42	M
WY0000051	411	PITTSBURG AND MIDWAY COAL MINE	0	0.000	0.00	I-2
WY0024546	500	RESERVE OPERATION CORPORATION	3500	0.002	0.03	I
WY0022357	401	ROCK SPRINGS, CITY OF	760	2.000	6.34	M
WY0033995	401	SADDLELITE STORE	0	0.000	0.00	I-2
WY0021806	401	SUPERIOR	0	0.000	0.00	M-2
WY0000043	401	UNION PACIFIC RR - GREEN RIVER	1500	0.030	0.19	I
WY0020311	411	UTAH POWER & LIGHT CO (NAUGHTON)	820	5.730	19.61	I-5B
WY0026093	401	VOLCIC MOBILE HOME PARK	0	0.000	0.00	M-2
WY0024457	401	WESTERN HILLS TRAILER COURT	684	0.040	0.11	M
WY0023809	401	W-K MOBILE HOME PARK	0	0.000	0.00	M-2
WY0000086	401	WYO. FISH AND GAME - DANIEL	300	3.000	3.76	I-5D
WY0000094	401	WYO. FISH AND GAME - BOULDER	300	2.000	2.50	I-5D

